

The Sustainability Report

2024

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Introduction: A Year In Sustainability

Why fashion will be forced to confront climate change and inequality. And how the technology sector is aiming to support it.

Front cover illustration by [Barney Ibbotson](#)



By Ben Hanson
Editor-in-Chief
THE INTERLINE

Time can be pretty elastic.

If you're a geologist examining ancient rock formations, for example, a year doesn't mean a great deal. But if you're a trend analyst working to document fast-moving markets, chart new channels, spot firefly-lifespan moments and communities, or catalogue the whims of emerging demographics, twelve months is an eternity.

And if you're a business owner or financial officer evaluating four quarters of up-and-down performance shaped by the macro-economic rollercoaster, a year can rush and drag depending on how and when you slice it.

How we perceive the importance of a year depends heavily on our perspective.

But from an environmental sustainability point of view, there's only one timeline that matters - and on that timeline every year counts. Because if you're a progressively heating planet, or one of the billions of people who those rising temperatures impact (either subtly, or profoundly as part of a worsening pattern) then a lot can happen in a year.

This elasticity of time is one of the hardest things to debate sensibly when it comes to climate change. And it's something I've struggled with finding the right way to talk about since The Interline introduced our first Sustainability Report in 2023.

It's very easy to sound alarmist (even though the klaxons have been righteously sounding for decades now) if you spotlight weather in the here and now, because weather can be unpredictable. And it's easy to come across as passive if you look at climate in the longer term - making it feel like a distant concern to people with more pressing ones, like the cost of food staples, political upheaval at their front door, or persistent, institutional inequality to try and wrestle with.

But it seems like the quickening pace of change is going to solve that problem. Because what a year means, on the planetary calendar, is compressing in a very visible way. And the impacts of that compression are highly likely to become not just observable in the abstract, but tangible in personal and professional ways for basically of us.

Over the last thirty or so years, the rate of sea level rise at the US coastline has doubled from its long-term trend, which was set in the century or so prior. And it appears essentially locked-in (i.e. nothing we can do will stop it) that the same sea levels across the United States will rise, on average, by as much in the next 25 years as they did in the previous 100. And an IPCC report suggests that global sea levels could be more than a metre higher by 2100 than they are today.

Here, we're talking about significant transformations that will occur between 25 and 75 years from today - all within the lifespan of people alive or being born at the moment. At a personal level, this means we are highly likely to have to

confront the manifestations of climate change far sooner than many of us realise. A few hotter days here and there, or a wetter spell than usual, will quickly spiral into persistent patterns that could easily disrupt things we currently take for granted.

The same is set to come true at a professional level, too.

Those sea level rises will translate into an increased risk of flooding in consumption markets across the USA, UK, and Europe, potentially changing everything from consumer buying power (climate disasters do not tend to be kind to the discretionary spending part of the economy) to the predictability and seasonality of demand.

And the most pronounced risks are elsewhere in the fashion value chain, with sea level rises set to increase the risk of flooding for cities in Thailand, Vietnam, China and many other sourcing and production destinations. As the pandemic showed us, any disruption to the worldwide sourcing network can have deep and abiding impacts on the way product shows up (or doesn't) in those aforementioned consumption markets.

This, too, is confining our lens artificially to just the impact of flooding. It's not taking account of the fact that a majority of the world's population - close to 5 billion people - experienced one or more extreme heat events in June of this year alone. At least a billion of those people were situated in countries where apparel, textile, and garment manufacturing and export are significant economic engines. A further 300 million plus were situated in key consumption markets in North America and the EU.

And just as with flooding, there is further warming locked-in that is all but guaranteed to see the environmental backdrop of both production and sourcing regions and consumption markets changing the way we think about what products to bring to market - and when.

That's also thinking with just a cold, commercial hat on - something that's much harder to do when we widen our outlook even further to take in the humanitarian impact of

these climate shifts on the people who make up the vital links in the apparel supply chain. Fashion Revolution found, this year, that just 6% of brands have published details about how they intend to support their upstream partners in managing the impacts of the changing climate - despite the importance that those partners play in the brands' own business continuity.

This is also emblematic of a wider disconnect between how brands (on average) value the input of their supply chain partners, but place comparatively little weight on protecting and compensating those partners. More investigation undertaken this year revealed that the "wage gap" - the amount that garment workers are paid, averaged out across different territories, compared to the definition of a living wage in those countries - stands at close to 50%.

This means that nearly half of the money garment workers need to earn in order to be considered fairly-paid for their region is missing - and year-over-year improvement stands at just 1% in the most recent period. Here a year could count for a lot.

Across the board, though, the trend lines are clear. The world is not getting any cooler, and short-term weather patterns are becoming more extreme, more disruptive to society, and more problematic for fashion as a result. And people are, largely, not being elevated in importance quickly enough - either to offset how strongly they are being impacted by climate change, or as recognition of the vital role they play in the value chain.

Fashion, of course, is not responsible for all - or even most - of this. But as an industry that uses a significant amount of fossil fuels in logistics, distribution, and in the production of petroleum-derived synthetic materials, it's an industry that inarguably has an outsize footprint. And as an industry that throws away an alarming amount of what it makes, its secondary impact is also larger than other sectors with similar upstream impacts.

Most importantly, though, fashion is also perhaps uniquely exposed to the fallout from these changes, and our industry realistically has little time left to be proactive, rather than reactive, about them.



These are significant climate and cultural pressure points that are essentially certain to happen within a 25, 50, and 75 year horizons. Along each of those milestones, the landscape of fashion sourcing, production, and consumption could be radically transformed - and the effects of those transformations could also compound.

To be clear: we are talking about a complete transformation of the fashion industry within a lifetime - one that runs the full spectrum from demand sensing and design through to production, sale, and the circular economy.

To put those milestones into context, let's consider the fact that it has taken more than 20 years for 3D working to really take root in fashion. Or let's remind ourselves that we've only had modern smartphones for 17 years.

Think back over the length of time you have had a smartphone, and then consider that the entire landscape of sourcing, producing, and selling could shift in profound, potentially irreversible ways within that same timeframe. Then think about the fact that it's going to happen again - and likely again - without any of our near-term interventions being capable of affecting the outcome. And every year we don't act brings the deadline for the next fundamental shift even further forwards.

A lot can happen a year. And the years will start piling up quickly.

All of which is a slightly preachy way of reminding readers of this year's publication that the need for environmental and social action is more pressing than ever. Fashion (as well as other industries) must pursue a strategy of deep decarbonisation, a much finer balance between supply and demand, a genuinely circular business model, a comprehensive overhaul in material usage, and a completely recalibrated definition of "time to market" for new products. And fashion must also pay its workers fairly and protect them against what's coming.

Nobody reading this, in their heart of hearts, will disagree. Where individual and business-level divergence happens is when we start to think about how that mandate I've just set out clashes with commercial interests.

And this, for me, is where technology has to enter the picture. Outside of first-party data, systematised transparency and traceability, material science and innovation, complete and equitable collaboration and accountability, standardised and objective labour quantification and costing, and an full, tech-enabled chain of custody, I see no way for fashion to take the necessary environmental and humanitarian steps without sacrificing too much of its business model as it exists today.

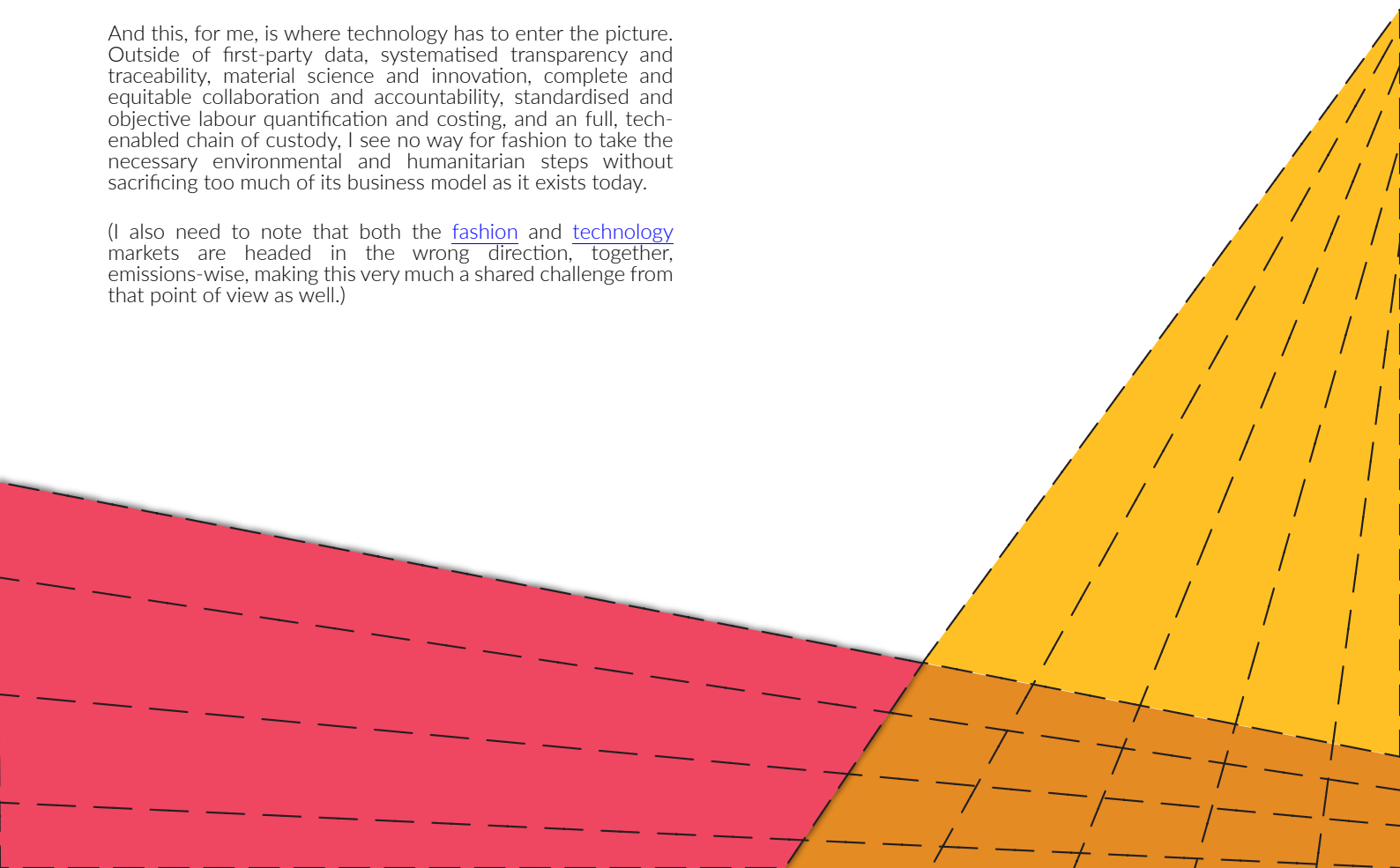
(I also need to note that both the [fashion](#) and [technology](#) markets are headed in the wrong direction, together, emissions-wise, making this very much a shared challenge from that point of view as well.)

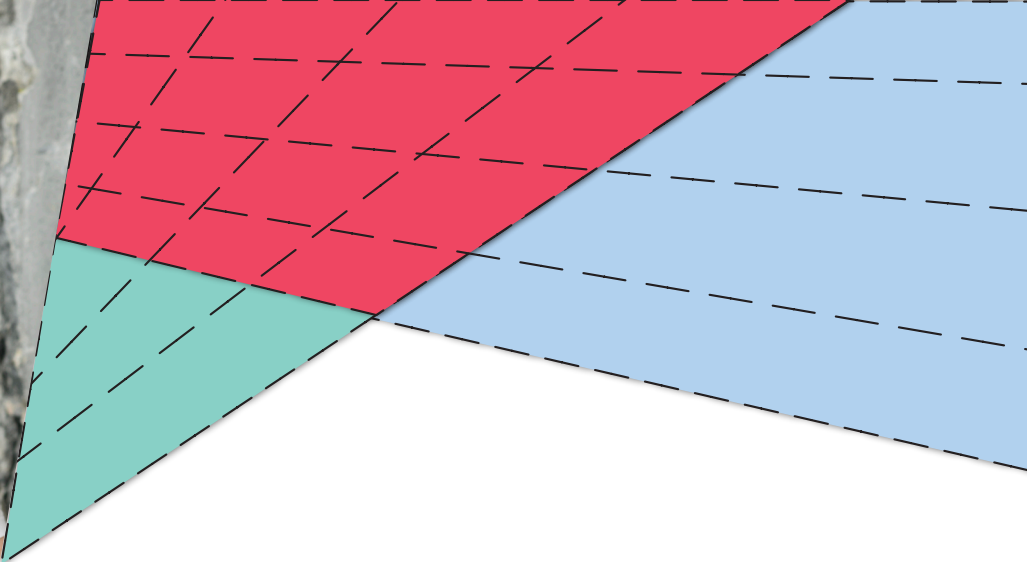
In last year's Sustainability Report, I wrote that "new technology innovations targeted at particular sustainability areas have been continually emerging, and brands have been constantly surprising - or frustrating - the world with their innovations or their inertia." After the passing of another year, this holds largely true, but with one encouraging change: those innovations have become to coalesce more strongly into a more complete sustainability ecosystem, rather than a set of disconnected parts.

Last year we also referred to the task of creating sustainability tools and solutions as being akin to building ladders out of a fiery pit at the same time that a crowd of people are actively trying to climb them. There is a huge weight of expectation being placed on technology in general, as a panacea to help solve fashion's biggest challenges and capitalise on its biggest opportunities, but this is especially acute in sustainability: that vital mandate for change is translating into urgent demand for support, and technology vendors, industry bodies, material scientists, and supply chain innovators are working at a historic pace to meet that demand.

In this report you will find opinions from key figures across those different disciplines - people who are focused on making that ladder wider, more stable, and more accessible, instead of just taller.

Through editorial, interviews, and analysis we have solicited their thoughts on what a year means in sustainability for fashion - and in technology's role in supporting it. And alongside those you'll find research, opinion, and analysis from our core team and extended contributor network, all designed to document the same thing: what's happened in a year in sustainability, and what momentum we believe there is to find (and how much needs to be created) year over year after that.





Finding A Way Forward

By *Sebastian Klinder*
Managing Director
MUNICH FABRIC START

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Reducing the environmental and social impact of fashion without sacrificing its essential, creative spirit is the largest industry challenge of our time.

The planet is changing, the people who make up the fashion value chain are being directly and indirectly affected, and geopolitical uncertainty and global inequality persist. The companies that create fashion are facing a call from consumers and legislators to act on all these things - at the same time as continuing to innovate and explore new creative and cultural frontiers.

The scale of the challenge and the timeline required for action are also both significant. This fast-changing crisis is already beginning to affect raw material availability, reshape sourcing strategies, and starting to unbalance the previously-predictable seasonality of the fashion calendar. And the clock is ticking on the race for solutions.

There is no turning back from this question. Which means that our responsibility, as fashion professionals is to find a way forward. Every fashion designer, merchandiser, buyer, marketer, executive, and every brand, every retail business, and every supplier must take this responsibility on board today.

But those are not the only organisations who will be responsible for delivering much-needed change. Every trade body, every media organisation, and every fashion event must make the same commitment. They must ask themselves what they can do to become not just a passive, background part of the solution, but an active participant in helping fashion to fundamentally transform its calendars, its purchasing practices, its design and development approaches, and much more.

It is my belief that we (and other industry events) can play that role by creating destinations and communities that support fashion professionals across the supply chain in seeking:

- Clear intentions and measurable outcomes for taking environmental and ethical action.
- More concrete, earlier visions for what products they intend to bring to market and when - to minimise waste and curb overproduction.
- The knowledge of how to model and manage the impact of each individual product, across a spectrum of environmental and social metrics.
- A thorough understanding of the real provenance and sustainability profile of fabrics, and a first-hand way to interact with and explore advances in material science and alternative fibres.
- A hands-on grounding in the technology tools and processes that are available to them, and an understanding of where those tools can deliver value.
- An opportunity to take in (or even take part in) critical, multi-disciplinary discussions around the urgency and the scale of the problem - and around ways to begin addressing it.

A big part of this picture is innovation across software, hardware, and services, certainly. Which is why Munich Fabric Start is happy to support this, the second deep-dive sustainability report from The Interline.

But an equally large part is bringing all these different components into one place, to help concentrate and accelerate these necessary changes.

At Munich Fabric Start, we are focused on delivering everything above. A clarity of vision for our attendees and their partners. A destination for experiencing fabrics and fabric innovations first-hand. A dedicated area to explore technology and scientific innovation. And an education programme that includes open, candid debate about what needs to happen, and how we can collectively make a difference at the scale and speed necessary.

Like every business, we are also constantly asking ourselves what we are doing to help create a way forward. And I believe we have a good answer: that fashion is more likely to find those answers by coming together in a space designed for inspiration and interaction.

Discover more about Munich Fabric Start, which most recently brought together fabrics, resources, technology, and sustainability innovations in its headline Munich show on 3rd and 4th September 2024 - and find out more about the next Munich Fabric Start event, which will take place on 21 and 22 January 2025.

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MARKET ANALYSIS

Is technology building a bedrock for sustainability?

KICKING OFF A CIRCULAR REVOLUTION: CAN FOOTBALL LEAD THE WAY IN SUSTAINABLE FASHION?

AS THE OUTPUT OF CLOSED-LOOP, HIGH-SPEED, SEASONAL ECOSYSTEM, THE SOCCER JERSEY CAPTURES A LOT OF THE CHALLENGES OF THE WIDER FASHION MARKET IN MICROCOSM. THIS ALSO MAKES IT A PROVING GROUND FOR NEW INNOVATIONS, NEW PROCESSES, AND NEW IDEAS THAT COULD PAVE THE WAY FOR WIDER TRANSFORMATION.



By Joanna Czutkowna

CEO

5THREAD

Joanna Czutkowna is CEO of 5THREAD, a consultancy company specialising in sports, apparel and education founded on 5 key principles of circularity, inclusivity, partnerships, transformation and leadership. She is also a doctoral researcher completing her PhD on the circular economy within sports apparel and host of the 5THREAD Podcast. She has extensive hands-on industry insight into systems change which she uses to support organisations' transition towards more circular business models.

The clothing industry clearly has a problem, ranked the fourth highest for its negative impact on the environment and climate change and the third highest for water and land use¹. As consumers, we are buying more clothing than ever before, with clothing and footwear consumption expected to increase by 63% by 2030². Yet the average number of times we wear our garments has decreased dramatically, resulting in a truckload of textiles being sent to landfill or incinerated every second³.

These stats are not new, the fashion and clothing industry has for a long time been aware of its impact but has preferred to kick the thorny issue of taking responsibility for its emissions and environmental damage into the future by setting action plans and reduction targets into the ever-distant future. 2030 net zero targets have become 2050 targets as brands realise the challenges they face in making systematic changes in how the industry works in what essentially equates to 11 buying seasons.

We have seen some progress by global brands who are investing in circular business models such as rental, resale and repair services, but many of these seem tokenistic, used primarily for marketing purposes while lacking significant investment and are under pressure to deliver profitable numbers rapidly. With the legacy of poor sales during Covid and ever-increasing competition, sustainability and transitioning to new ways of working such as circular business models are being sidelined in a bid to drive sales through the traditional linear model of take-make-waste.

While smaller brands, which tend to have sustainability as an integral part of their DNA from the start, are pioneering circular business models such as [The Little Loop](#) for rental and resale childrenswear and [The Seam](#) for high-quality repairs, they often face investment challenges and can struggle to get to the tipping point of scale needed to make these circular business models commercially viable long term.

After 20 years working in innovation in fashion, holding multiple roles from being on the ground in the supply chain to being part of the decision-making team in the board room, I understand the constraints brands are working under. Circularity is great as a theory, especially in a perfect world, but putting that theory into practice with today's unpredictable, ever-competitive retail landscape is a different matter. However, with a new raft of legislation being driven in the EU outlined in the [EU Strategy for Sustainable and Circular Textiles](#), brands who want to future-proof themselves need to start transitioning to new business models now, and implementing strategically considered systems change. Sadly, the speed of change seems woefully slow, at times it even feels as if the industry is going backwards in making change. When time is of the essence and winning the battle against climate change is fundamental, can the sports sector help lead the way towards transitioning towards a circular fashion industry?

After decades in the fashion industry, I now specialise in sports apparel, specifically professional and replica football shirts. Why – because sports have a unique power to influence, motivate and drive mass change in the behaviour of billions of



fans, aka consumers. Fashion items and football shirts have a lot in common, both are highly desired items, which can hold significant emotional value, they are mass-produced using globalised supply chains, and both become redundant within a season. Football clubs traditionally release at least 3 new replica shirt designs per season, home, away and third, not to mention special edition kits (Napoli released 13 shirts in one season alone!). Shirt designs are updated seasonally giving replica shirts a seasonal shelf life of around 10 months. While on the professional side, around 60% of all professional football kits are destroyed by landfilling or incineration at the end of the season⁴.

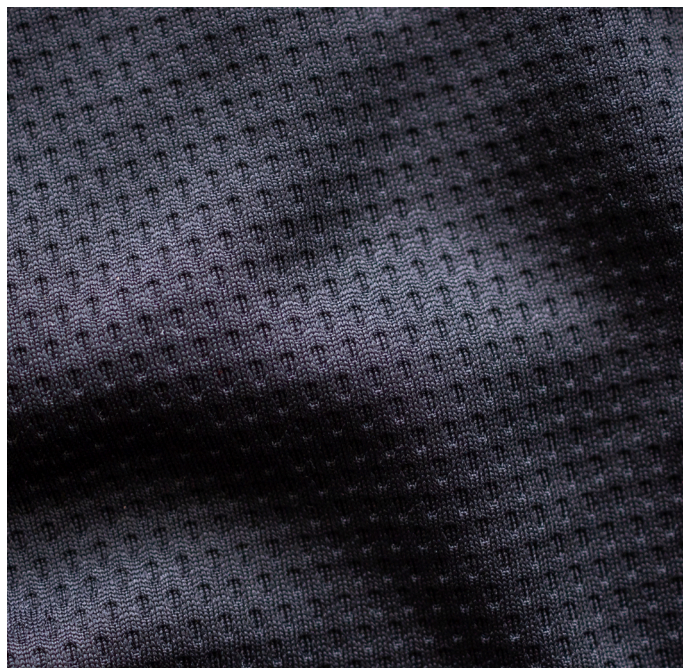
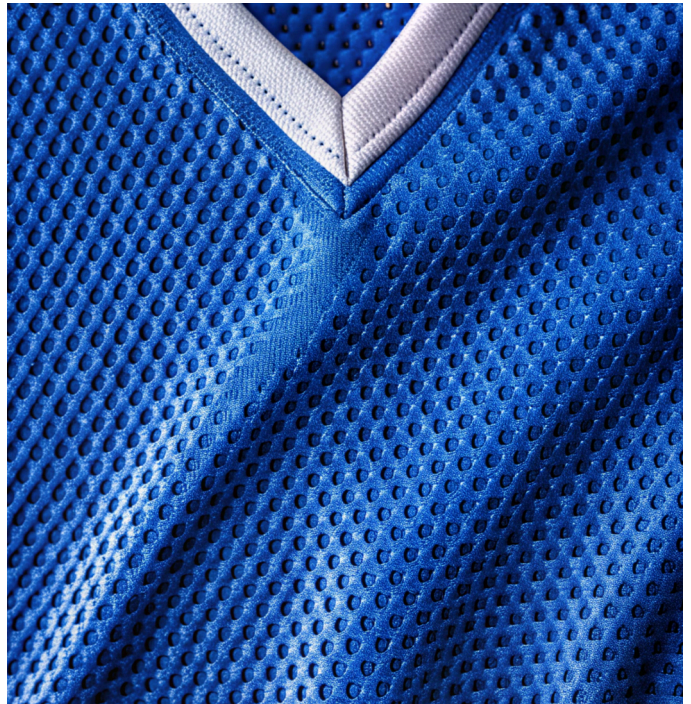
Circularity in the context of football shirts involves designing and producing shirts to minimise waste, maximise the use of sustainable materials, extend product life and facilitate reuse and eventual recycling. This approach encompasses several stages, from material selection to production processes, digital integration, usage, and end-of-life management. The challenges involved in achieving circularity in football shirts mirror those faced by the wider fashion industry, including the need for innovative technologies, stakeholder collaboration, consumer engagement, and systemic change. So, what do football and fashion have in common and what can football teach fashion about circularity?

1. MATERIAL INNOVATION AND SUSTAINABLE FIBERS

A critical first step in creating circular football shirts is choosing sustainable materials that perform both on and off the pitch. Traditional shirts like many fashion garments are typically made from polyester, a petroleum-based synthetic fibre that poses significant environmental challenges, such as high carbon emissions during production and microplastic pollution during use. However, unlike many fashion brands, many Premier League football clubs are now using recycled polyester as standard, (currently, most of the recycled polyester is derived from plastic bottles).

However, from the 24/25 season, Puma is producing all its replica shirts from textile to textile recycled materials, through their initiative [Re:Fibre](#). Puma has aligned with strategic partners including clubs such as Man City to encourage fans to donate old shirts and clothing by setting up donation points in the selected stadiums. Clothing is collected and reprocessed to be made into new shirts. Puma has also held activation days and upcycling workshops to involve fans in extending the product life of their garments. This approach not only supports in educating a wide audience of fans who may not otherwise know or care about sustainability, it also reduces dependence on virgin materials. While we have seen collection bins in retail stores for fashion for some time, we have yet to see textile to textile materials being used at a mass scale in fashion, or a genuine concerted effort by brands to mobilise their consumers to extend the product life of their garments.

Beyond recycled polyester, there is a growing interest in bio-based materials, such as biodegradable polyesters or fibres derived from plant sources like bamboo, hemp, or algae. Forest Green Rovers football club previously used a blend of coffee grounds as a feedstock for part of the material for their shirts. These materials offer the potential for reduced environmental impact compared to conventional synthetics, particularly if they can be grown and processed using sustainable methods and meet the same performance standards as polyester shirts.



2. LOCALISED AND ON-DEMAND MANUFACTURING

Typically manufacturing football shirts, as with fashion garments, involves long, complex supply chains, often spanning multiple countries and continents. This globalised production model is associated with high carbon emissions, resource inefficiency, and limited transparency, all of which are barriers to circularity. To address these issues, some manufacturers are exploring localised and on-demand production models, using AI and data analytics to help optimise production and inventory management, reducing overproduction and waste. Brands are increasingly investing in blockchain technology which can help ensure that materials are sustainably sourced, production processes are ethical, and recycling options are available. By producing shirts closer to the point of sale and in smaller, more customised batches, brands can reduce transportation emissions, minimise waste, and better respond to consumer demand.

For EU clubs, Portugal could become a production hub enabling smaller quantities using micro-factories cutting transportation lead times and emissions. [FC Internazionale Berlin 1980 E.V](#) a grassroots club based in Germany have chosen to manufacture their shirts in Portugal for this exact reason. They have created the world's first football shirt which uses cradle-to-cradle gold certified materials, proving that even with limited resources change and implementing higher standards is achievable at grassroots level given ambitious leadership.

Technologies like 3D knitting, digital patternmaking, and automation in textile cutting and sewing can facilitate these new manufacturing models. 3D knitting technology for example, allows for seamless construction of garments, reducing fabric waste and increasing production efficiency. Additionally, digital manufacturing tools enable rapid prototyping and shorter lead times, making it easier to produce shirts in response to real-time demand rather than forecasting sales months in advance, reducing waste and excess inventory.

3. EXTENDING PRODUCT LIFE USING CONNECTION AND LEGACY

A key aspect of circularity is extending the lifespan of products through design. For football shirts, which retail at a much higher price than many fashion items (on average for Premier League clubs at £80) this means designing for frequent use, washing, and wear while also considering eventual recycling. To extend the shirt's usable life, supporting fans on how to care for their garment is vital. Implementation of digital product passports embedded in garments, which store detailed information about a garment's composition, production, care instructions, and recycling options, can facilitate circular practices by making it easier for consumers, recyclers, and manufacturers to access relevant information. Smart labels, such as QR codes or RFID tags, can be scanned to access this information, enhancing transparency and enabling better decision-making throughout the product's lifecycle.

Beyond the practical, designing for circularity means designing a shirt that embodies the history and heritage of a club. Creating an emotional connection through fabric, colours and iconography that bonds club and fan across seasons, creating a legacy that negates the need to buy a new shirt next season. This bond has an emotional durability which encourages fans to retain, care for and value the shirt they own rather than see it as a seasonal disposable item.

Like fashion, the second-hand market for football shirts is already a thriving space, with fans often trading, selling, or collecting shirts from different seasons or limited editions. Brands and clubs can tap into this existing market by promoting and facilitating resale or even rental models for shirts. Online platforms like [Classic Football Shirts](#) and eBay, and speciality sports memorabilia sites already support this ecosystem, but official partnerships or dedicated club platforms could further legitimise and expand these channels. Rental models, where fans can rent shirts for a season or special events, could also be explored, particularly for high-value or limited-edition items. These models are gaining traction in the fashion industry as a way to maximise the use of garments, reduce waste, and provide consumers with more affordable and flexible options.



Left image: CFS

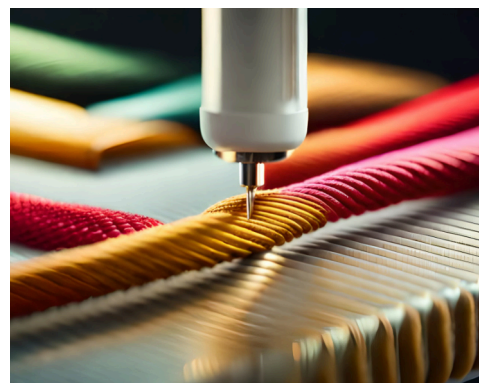




Image: re(boot)

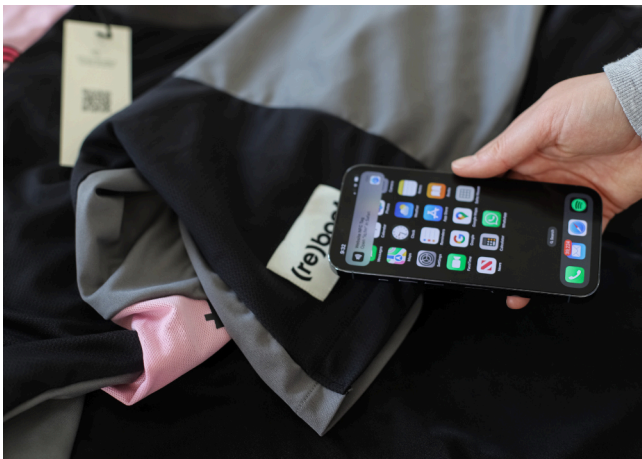


Image: re(boot)



Image: FC88



Image: FC88

4. ENGAGING FANS AND CONSUMERS IN CIRCULARITY

Brands and clubs can leverage their influence to encourage fans to adopt more sustainable behaviours, such as opting for recycled or second-hand shirts, participating in take-back programs, or supporting initiatives that promote circularity. Digital tools, such as mobile apps or online platforms, which make it easy for consumers to participate, interact with and track the impact of their actions are also growing in importance. Platforms such as [Pledgeball](#) allow fans to pledge to take a sustainable action, these pledges can be linked to their clubs which then allows different clubs to compete with each other on a leaderboard with those which have the most sustainable pledges from fans winning the title.

But how can clubs make money if fans don't buy new shirts anymore? By engaging fans by offering added value, creating a legacy or providing new experiences enabled by digital. This is supported by several upcycling specialists such as [FC88](#) which take damaged or defective shirts and turn them into other items such as laptop bags, by doing this they retain the emotional relevance of the shirt, and create new product streams which can utilise shirts that would otherwise go to waste. [re\(boot\)](#) a company specialising in curated upcycling of football shirts has partnered with Avery Dennison to combine physical products with digital technologies. Not only are some of their physical shirts upcycled from match-worn kit they also contain a QR code which allows the fan to access information about the shirt and in future have the potential to receive updated digital experiences over time.

Key to engaging any community, whether football fans or the fashion crowd, is authenticity and integrity. In a marketing world where greenwashing statements are common, it is vital that any circularity initiatives are done to create genuine change rather than as PR marketing spin.

5. LEADERSHIP

In order to drive a transition towards circularity strong leadership (and governance) is needed. While many leaders are working tirelessly to make change, many more are prioritising profit over the planet. We have seen the contradiction of yearly sustainability reports published detailing changes in GHG emissions year on year and promising reductions, while at the same time, promising shareholders increased profits driven through increasing sales.

The fashion industry is at best moving towards 'being less bad' i.e. improving on a linear model of production through investing in green energy in the supply chain for example, but a systematic change in reducing the production of new garments, replacing physical garments with digital experiences or dare I say it even a degrowth model seems at the moment decades away.

Unless brands are forced to change through legislation, they will maintain the status quo. This is why outstanding leadership and collaboration are needed to drive circularity more than ever. It will take ambition, visionaries, communicators and expert stakeholder and change management to implement this transition. It is on this point that sport has the most to teach fashion on how to approach circularity in a new way. Competitive sport is essentially getting the best out of people, it's about playing as a team to meet a common goal, it's about thinking creatively and strategically to win the game and it's about engaging millions in the potential of what is possible. If we can adopt some of those traits in transitioning the fashion industry towards circularity then surely, we will be on a winning streak.

KEY TAKEAWAYS FOR THE WIDER FASHION INDUSTRY

The circularity efforts in football provide several valuable insights and takeaways that can be applied to the broader fashion and clothing industry:

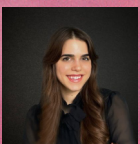
- 1. Material Innovation is Key:** Prioritising sustainable and recyclable materials, such as recycled or bio-based fibres, is crucial. However, these materials must also meet performance and aesthetic standards, necessitating continued innovation and investment in material science.
- 2. Design for Circularity:** Products must be designed with their entire lifecycle in mind, from production to end-of-life. This includes simplifying material compositions, avoiding non-recyclable components, and incorporating features that facilitate recycling or reuse.
- 3. Leverage Technology for Transparency and Efficiency:** Technologies like blockchain, AI, and digital product passports can enhance transparency, optimise supply chains, and engage consumers in circular practices.
- 4. Consumer Engagement is Essential:** Brands need to actively engage consumers in circular practices by promoting sustainable behaviours, offering take-back or recycling programs, and providing clear information on how to recycle or repurpose products.
- 5. Collaboration Across the Value Chain:** Achieving circularity requires collaboration between brands, suppliers, recyclers, policymakers, and consumers. Leadership, shared standards, and joint investments in technology and infrastructure are crucial for overcoming the barriers to circularity.



1. EEA (2022) Textiles and the environment: the role of design in Europe's circular economy
2. European Environment Agency (EEA) (2019) Textiles and the environment in a circular economy
3. EMFA New Textiles Economy: Redesigning fashion's future
4. [uefa_circular_economy_guidelines_low_res.pdf](#)

WHAT WILL IT TAKE FOR MATERIAL INNOVATION TO BECOME MAINSTREAM?

AFTER A DIFFICULT YEAR FOR THE ALTERNATIVE MATERIALS SECTOR, A
FOUNDER UNDERLINES WHY FASHION NEEDS NOVEL MATERIALS, AND
WHAT MINDSET THE INDUSTRY WILL HAVE TO ADOPT FOR THOSE
MATERIALS AND METHODS TO SCALE.



By Roni GamZon
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I refuse to live in a world without sparkles. I've always loved glitter—more is always better. When I was young, I wanted it everywhere: on my shoes, clothes, makeup, and bags. My mom would always get mad because we had glitter all over the house, as a result of my obsession. I understood at the time that it was a hassle for her to clean up, but today, I realised there was a much bigger issue at hand: the microplastics I was spreading around like a fairy waving her wand, covering our environment with plastic.

Fashion has followed a similar trajectory: using synthetic materials with youthful abandon, and only later realising the harm they caused.

Thankfully, regulations have caught up with us both. The EU has banned loose glitter, restricting synthetic polymer microparticles either on their own or when intentionally added to mixtures¹.

As happy as I am about these regulations, though, I still refuse to live in a world without glitter. I'd rather have the sun melt me first. But don't worry—this is where material innovation comes into play. Companies like Sparxells, Radiant Matter, and others are creating 100% plant-based products and alternatives. All the fun, none of the damage.

And that's the same trend we've seen in other material categories, where innovative companies pilot new ways to save the positive attributes of something we love, while shedding the negative ones - all without compromising on what made that material stand out in the first place.

So now, the big question: How can we ensure that in a few years, these solutions will be mainstream, allowing us to live in a naturally sparkling world? What does it look like to take those pilots and narrow applications and turn them into volume? And why are companies - and entire industries - struggling to make that transition?

2024 has already been a rough year for the alternative materials industry. First, the US-based Bolt Threads paused the production of its plant-based leather alternative, Mylo, after raising \$380 million and spending over 15 years on development. This was followed by the bankruptcy of Renewcell, a leader in textile-to-textile recycling, despite an IPO at Nasdaq and multiple brand supports and offtakes. (There may be light at the end of the tunnel for Circulose, the

company renamed after Renewcell's hero material following its acquisition earlier this summer.)

These were companies with great promise and materials and methods that could have improved the industry, so their downfall not only saddened many but also shook the confidence of brands and investors in material innovation as a category. If maturing, well-funded companies couldn't make it work, what chance did fledgling new initiatives have? The investment space is also struggling as funds have dried up, and potential backers are much more cautious and reluctant to invest and take risk on these type of innovations - novel ideas that could take a long time to see results from, in a sector where higher profile companies have already pulled back or failed.

In addition this has been a rough year for luxury as a whole, a sector which is very important in the process of bringing material innovation to life - Luxury's high price points, discerning consumers, and the segment's willingness to design around exciting materials make it a great potential partner, but at the same time the industry isn't immune to market conditions -and two of the first things to be cut at a lean time are sustainability and innovation.

That said, 2023/24 was also a great year, with many exciting launches and collaborations. Karl Lagerfeld released a NFW Mirum bag, which is 100% plastic-free; Balenciaga launched products made with Bananatex and Ephea (Gozen); and Stella McCartney and Ganni introduced multiple collaborations and products with alternative materials at their heart, such as Keel Labs' algae fiber, Polybion's bacterial leather, and our very own Savian by BioFluff.

The need for innovation and the momentum behind it are clear to everyone who takes the time to examine why materials matter so much in the first place. According to Business Of Fashion: "Up to 80% of a product's environmental impact is determined at the design phase and is baked into materials and dyes."² Regulations, too, are coming, with "more than 35 new pieces of sustainability-linked legislation forecasted to go into effect around the world in the next two to four years, targeting import restrictions, product design guidelines, labeling requirements, and more."³ In addition to that there are supply chain risks in sourcing conventional materials - especially as the effects of climate change become more pronounced - as well as changing consumer demands.



All images: Studio Saison, Romain Guittet for BioFluff.

This is not news—the industry seems to have already realized the importance of material innovation and its critical role in meeting targets, regulations, and consumer expectations. Fashion for Good estimates that there are over 650 innovations in the material innovation space, across materials and recycling—some at earlier stages, others on the verge of having viable products. So why don't we see these innovations in the market, and for the ones that do make it into stores, how can we ensure they stay there?

The simplest answer is that novel materials have to be completely free of compromise, and they have to offer the least possible friction to industrialise and embed into the existing supply chain. Let's dive a bit deeper into what I mean by that.

The Perfection Issue: No matter what they're made from, or how intensive the R&D and production process behind them was, new materials are expected to have the same aesthetic, performance, production timelines, and scale as conventional materials, while being 100% natural, with a closed supply chain, traceability, social responsibility, longevity, and biodegradability—all at a competitive price from day one. This is the biggest misconception that must change in the industry.

Brands should not and cannot compromise on quality, aesthetics, scale, and impact, just as consumers won't. The Sustainable Advisory Services report, "Next Gen to This Gen" found that the biggest variable to drive the adoption of a new material is performance, quality and aesthetics from a brand and supplier perspective. Innovators, suppliers, investors and supporting organizations all stated that the biggest challenge for adoption is the higher price point attached to a new innovative material⁴.

However, the expectation that innovative materials must be perfect from the start is unrealistic. Innovators and brands must work together to overcome these challenges before industrialization.

Quality: Innovators must understand that quality is absolute, especially in luxury. A good approach is to identify products or use cases where performance standards are less strict, or

where perfection is not required, at least initially. On the brand side, care and repair services can help compensate for any shortfalls.

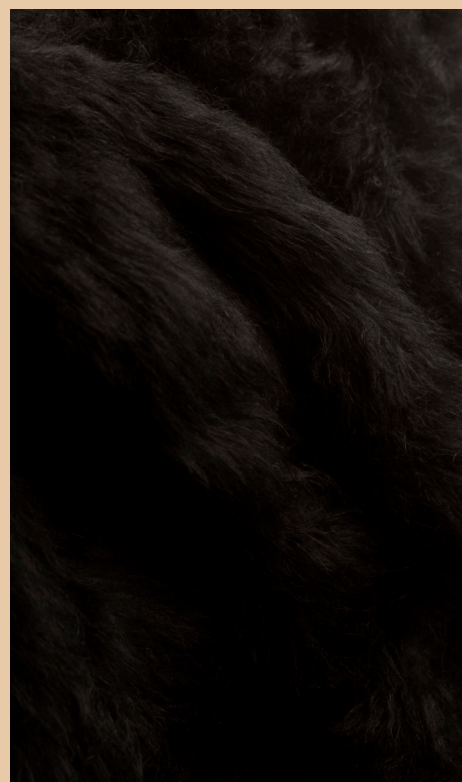
Aesthetics: It is essential for material innovators to work closely with brands and get continuous feedback on the aesthetics and handfeel of the material. This is a tricky area—difficult to measure, quantify, and varies greatly between brands. While it's valuable to gather input from industry leaders, it's also important to recognize that every brand is different. When showcasing our plant-based developments, I was often surprised at how one brand could strongly dislike a style, calling it reminiscent of a "wet dog," while another, equally influential brand, would love it and place an order on the spot.

Brands need to understand how to work with innovation and adapt their products to highlight the unique qualities of these new materials, especially in the early stages. For example, our plant-based fur, Savian, is not identical as polyester or animal fur. Instead of making us match the exact handfeel and texture of these traditional materials, brands like Ganni and Stella McCartney have embraced the new textures and the unique products they bring to life - finding another route, not a compromise.

Production Scales & Timelines: One of the most challenging aspects for startups is moving from development to production. Setting up and running a successful production facility presents a whole new set of challenges. My co-founder, Martin Stuebler, previously worked at a well-established startup in the alternative leather space and witnessed the difficulties of setting up production. So, from day one, our brilliant Steven Usdan, an expert in production (having been in the space for over 40 years and building the largest Cotton recycling facility in North America) made sure we partnered with manufacturing companies to ensure we could produce our materials commercially as soon as possible. While this approach may not be feasible for every material, every innovation should consider production partners early on and aim to utilize existing machinery and infrastructure as much as possible, making a new material able to "slot in" to the existing supply chain.



GANNI Bou bag, Savian by BioFluff. Photo by MOON



Studio Saison, Romain Guittet for Biofluff.

The pursuit of perfection can be the enemy of progress: Being 10% better is still better than 0% better. Often, brands expect every aspect of a new material to be perfect and meet the highest sustainability standards, which is admirable. However, it's important to make incremental improvements rather than waiting for a perfect solution. Brands should support innovation and experiment with it, even if it's not yet perfect. For instance, if there's still a small percentage of PU still incorporated into the material, or the dyeing process isn't entirely sustainable, it's crucial to recognize any incremental improvement over conventional materials. Every new material or product launch that includes material innovation pushes the industry forward, creating pressure on other brands to act, raising awareness among consumers, and drawing investor interest. To reach the ideal sustainable solutions, we must act even before they are perfect and make peace that some may never be drop-in or perfect, but at least tremendously better.

Price: Brands all love green 🌿, but let's admit that they love a different kind of green way more 💰. Price is often the final and most difficult hurdle for material innovation. There is a misconception that innovative, sustainable materials should be priced competitively with conventional materials and that the same margin rules should apply.

If a material is innovative and meets all other criteria mentioned, it typically involves substantial R&D costs, better (more expensive) processes, and often more costly production locations (like Europe instead of China). Additionally, significant investments back these innovations, adding pressure to see returns.

There's also a "chicken and egg" situation where innovators need large, repeated orders to reach economies of scale and reduce prices, but brands want competitive pricing from the beginning. The perception that innovative materials should be priced similarly to conventional ones is a significant problem. These materials shouldn't be merchandised like conventional materials; instead, brands should treat them as investments today to secure better materials at the same price tomorrow. Brands should also understand that the extra cost of sustainable materials should be offset by savings in other budgets. These materials offer rich storytelling, great marketing opportunities, and can help with carbon and sustainability taxes. Therefore, they shouldn't be priced using the standard method of multiplying material costs, but rather integrated into standard pricing, recognizing their broader contributions.

BONUS CHALLENGE: THE MULTISTAKEHOLDER PROBLEM

Both within brands and across the industry, a multistakeholder approach is essential.

Within Brands:

One of the biggest challenges for a brand to actually reach any sustainable work is the distance between product, purchasing and design teams to their sustainability team. This is in no way a critique of sustainability teams as they have a very difficult job, and are exceptional at every brand I have had the chance to work with, however there is usually a big distance between them and budgets, product and brand strategy.

Sustainability shouldn't be the sole responsibility of sustainability teams—it should be everyone's responsibility, from the Creative Director and CEO to merchandisers, designers, production, and sales teams. Otherwise, innovation will never leave the sustainability department. Sustainability teams should identify the right solutions for the brand and bring them forward to multiple stakeholders. However, this often isn't the case, and they may not have access to key decision-makers. I recently spoke to the former Head of Sustainability for a major brand, and they told me that in their first week, they asked when they would meet the Creative Director, only to be told they never would.

Creative Directors are, of course, some of the busiest and most difficult people to reach in the industry (and the world), and they shouldn't be bothered with every little sustainable innovation. However, it's time to engage them in the conversation. Creative Directors are always inspired by nature—it's time they use it. If we don't engage in these conversations and introduce designers to beautiful, inspiring innovations, the sustainability conversation and the fashion conversation will remain separate.

Innovators need to work with creatives to inspire them and create something that matches their artistic vision. But designers also need to engage in that process.



GANNI Bou bag, BioFluff.
Conceptualised by @pitch_studiosTM and 3D artist @berenicgolmann

A great example of a place where sustainability is a responsibility of every single role, and the collaboration within the brand is exceptional is Ganni. Sustainability is at the back of every employee's mind, and that clearly translates into their work. Their designers, merchandisers, marketing team, creative Director, CEO and even stakeholders are all part of the conversation and work together to implement innovation for a more sustainable brand. It is felt within every conversation, interaction and collaboration. I was very pleasantly surprised when I visited their HQ that even their lunch and every aspect of their office were well thought out and considered what was best for the planet while staying cool, fun, and true to the brand.

Within The Industry:

Let's admit something: all the brands are looking at the same innovations, and all the innovations are looking at the same brands. It's not uncommon for me to attend a brand meeting and see a fellow innovator I know well coming out of a meeting with them.

There are several things that, at an industry level, should be well-understood:

- This is a small space and there are only so many innovations at a given moment, and only so many brands that are big enough to be able to work with innovation.
- Brands are all having the same difficulty with innovation, and the same questions, while innovators are having the same difficulty with the brands.
- If we have a more collaborative approach as an industry, and have more shared support between brands this can push sustainability much further.
- Competition should be on design and brand power, not on sustainability, this is where we all need to collaborate.
- Brands need to come together to assess solutions, and then support them together, to help them achieve the support and scale they need to reach the perfect solution in every aspect mentioned above.

CONCLUSION: BRIDGING THE GAP FOR A SUSTAINABLE FUTURE

Material innovation could hold the key to transforming the fashion and luxury industries, but the path to widespread adoption and scale is not going to be an easy one. From balancing quality and aesthetics to overcoming production hurdles and price misconceptions, both brands and innovators must collaborate closely to ensure these solutions don't just stay concepts but become integral parts of the market.

The journey from innovation to mainstream adoption will demand patience, flexibility, and a willingness to embrace incremental improvements. It also requires a shift in mindset—from seeing sustainability as an add-on to recognizing it as a core component of brand identity and strategy. As more brands engage with innovative new materials, supporting and investing in them even before they reach perfection, they will pave the way for a future where sustainability and luxury can coexist - a place where creativity can run free without pulling a huge amount of environmental baggage with it..

In the end, the goal is not just to meet regulatory requirements, or to respond to changing consumer demands. It's about leading the industry toward a world where the materials we use are not only beautiful and high-performing but also kinder to our planet. The sparkle doesn't have to disappear—it just needs to evolve naturally.

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1. Commission Regulation (EU) 2023/2055 <https://eur-lex.europa.eu/eli/reg/2023/2055/oj>
 2. Business of Fashion, The State of Fashion, '91
 3. Martinez et al., "Sustainable Raw Materials."
 4. Sustainabelle Advisory Services, 2024. Next Gen to This Gen: Scaling Material Innovations in the Fashion Sector. Paris: Sustainabelle Advisory Services, 2024.



All images: Studio Saison, Romain Guittet for Biofluff.

EMPOWERING FASHION'S SUPPLY CHAIN WORKERS MAKES THE INDUSTRY MORE SUSTAINABLE – SO WHY ISN'T IT STANDARD PRACTICE?

UNDERSTANDING THE THREAD FROM ETHICAL ACTION TO SUSTAINABLE PRODUCTION, AND WHY SUPPORTING SUPPLY CHAIN WORKERS WILL BE ESSENTIAL TO FASHION'S FUTURE.



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**WHETHER WE CONSCIOUSLY
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Anyone somewhat versed in the business of fashion will be familiar with the alliterative three p's framework of planet, people, and profit. When first said successively, these three short words advanced a shared global lexicon of how businesses to this day think about the extent of their negative impact.

And while many of us — myself included — assert that our current corporate system is structured in such a way that continues to insist that profits come before all else, this concept of the triple bottom line signifies mainstream changes to the way we now think about the long term effects of the fashion industry.

Now, three decades on from the three p's making its way into mainstream marketing theories, almost every large business has its own Corporate Social Responsibility strategy, pledges that align with the UN's Sustainable Development Goals, and, more recently, transparent and accountable Science Based Targets to reduce their emissions.

However, at the underlying root of these frameworks are the three p's and the contradictions, challenges, and hard work that come when businesses attempt to harmonise these three words through action.

So, as we pass the point of no return when it comes to the climate emergency, it is vital that we question whether these frameworks go far enough to effectively emphasise the intrinsic link between sustainable production and ethical practices and are capable of guiding brands toward a future that benefits all three.

COPY AND PASTE: SUSTAINABILITY CONVERSATIONS

Over the years, I have attended many conferences, networking events, and panel discussions, all focused on sustainability in the fashion industry, but what has always been most strikingly concerning to me is the disconnect I feel between conversations that take place in these spaces and the realities of global fashion supply chains. These discussions often focus on planetary health from a Western lens, failing to acknowledge the growing economic regions on which we will most depend to enact change.

These are not just the consumers and business owners but the supply chain workers that are most at risk of experiencing the fallout of continued unethical practices. Not voiceless but silenced in our capitalist system, they farm our raw materials, transform them into textiles, manufacture these into products, and then dispatch them to our front doors for us to wear and discard.

Whether we consciously admit it or not, there is a pervasive feeling within the fashion industry that such workers are disposable - or at the very least endlessly replaceable. Examples like COVID-19 evidence this. It was factories that took the brunt of the shift in consumption during the pandemic, as brands cancelled over \$40 billion of finished and in-production goods orders from factories and suppliers - the owners of which quickly protected themselves by letting their workers go.

The fashion industry must learn from such missteps and quickly. Whether the final judge is a regulatory or the court of public opinion, it should never be our most vulnerable workers taking the fall when unprecedented global events throw businesses into a tailspin.

It is universally acknowledged that the human race continues to compromise our ability to exist on this planet as the climate crisis worsens. As extreme weather events accelerate in frequency and climate-sensitive regions become more at risk, supply chains will become increasingly defenceless to an undesirable and volatile, environmental, social, and economic future.

But if businesses are hoping to mitigate the loss of profit and growth, they cannot just focus on making the natural environment more habitable for all; we must also build a social system that is indiscriminately hospitable for everyone. Not just because it's the right thing to do — which it is — but because it is the key to unlocking new ways of working that are fair and equitable for humans and the environment.

It is clear that more brands must provide their diverse communities of key workers a seat at the table. They are not only uniquely skilled and experienced within their disciplines, but they also have the potential to use their knowledge to advise on more sustainable practices. The UN Development Programme shares in this school of thought, and their biannual Equator Prize rewards action that showcases the benefits of folding Indigenous Peoples and local communities into developing climate solutions.

Workers deserve not just to be empowered by brands because they have built profitable business models from their hard work and labour, but because they are best placed to help build solutions, and to help adapt products and processes to the inevitable changes that are coming for the existing environment.

PLANET AND PROFIT VS PEOPLE

Looking at the current state of the fashion industry, there is vast groundwork to be laid for the widespread adoption of such practices within sprawling commercial organisations. We cannot shy away from evaluating our existing shortcomings and asking hard questions, such as,

Are we trying to save the planet to the detriment of large parts of society?

And if so, are businesses now prioritising profit and the planet over people?

Looking at the shift towards electric vehicles (EVs), you might agree with my scepticism that people and the planet are viewed as equals. In recent years, there have been well-documented [human rights violations found in the mining of materials for car batteries](#), and [wildlife is reportedly under threat in Africa](#), as this practice scales at pace. And, now that the fashion industry moves towards embedding EVs into their distribution models, it is vital that brands examine these concerns more granularly.

Like the meaning of sustainability itself, there are many vantage points from which to interpret and critique the EV market, and while it is arguable that the [emissions produced by EV's is considerably reduced compared to the use of fossil fuels](#), should these ends justify such means?

From fashion's point of view, is innovation in and around sustainability actually equating to a net positive if it lessens the impact on the environment but places a similar or greater burden onto other human beings?

Textile waste in Ghana is a prime example of a similarly half-baked solution. En masse, consumers are only just waking up to our clothing waste's monumental impact on the region and its inhabitants. For decades, we in the UK believed that all our unwanted clothes could be donated to high street charity stores and given a new lease of life with a new owner – a win-win. Yet according to Greenpeace, [Ghana now receives an annual total of about 152,600 tonnes of second-hand clothes, known as Oburoni Wawu or "dead white man's clothes" in English](#). This shows how easily a feel-good initiative can become the opposite when the curtain of visibility rolls back - something that legislation and technology is doing at increasing speed and scale right now

Again, though, these problems simmer down to a lack of holistic and collaborative problem-solving involving at-risk communities and regions.

Failing to look at supply chains as an ecosystem has led brands to overlook unforeseen consequences and rush toward achieving reportable positive impact with tunnel vision. There are often limitations to the outcomes that brands are open to acknowledging, and as a result, we only address part of the fashion industry's systematic problems.



But, it is essential that care for people goes hand in hand with consideration for the health of the planet and profits, otherwise, we run the risk of implementing quick fixes that fail to see unsustainability for what it is – a plague on the fair society we claim to subscribe to in addition to the planet.

THE CAMPAIGN FOR FAIR AND ETHICAL SUSTAINABILITY

So, if brands are to explore how they can achieve harmony with the natural environment through practices that tip the balance of inequality in favour of fairness and equity for all human beings, collaboration – to me – is the most compelling proposition.

The [Fair Cobalt Alliance](#), for example, acknowledges the contentious nature of aforementioned EV production, in the following statement on their website “Cobalt plays a key role in enabling a transition to a green economy. Nevertheless, public discourse around cobalt has been predominantly negative, focusing, to a large extent, on the adverse impacts of mining activities. This creates a dichotomy between cobalt as a key to reach a clean, carbon-free future on the one hand, and its extraction being characterised by poverty-driven child labour and human rights issues on the other.”

The organisation leverages partnership as a mitigation to these atrocities by connecting stakeholders throughout the entire supply chain with a common purpose – the development of responsible and fair cobalt that can advance the deployment of more environmentally conscious technologies.

Similarly, The OR Foundation's [“Stop Waste Colonialism”](#) campaign looks to address the waste crisis in Ghana. By lobbying for more Extended Producer Responsibility (EPR) policies worldwide, the campaign hopes to shift end-of-life product responsibilities back onto brands.

And recent breakthroughs in EU regulations and laws are somewhat hopeful, aiming to make brands accountable for their impact on the planet by introducing [digital passports for traceability](#), [banning illegal waste shipments to the global south](#), and [clampdowns on greenwashing](#). But such solutions, however, might have been embedded earlier or more effectively, with the input of The OR Foundation and the Kantamanto community they collaborate with. The organisation now uses their expertise and first-hand experience to [analyse and suggest amendments to proposals regulation in both the EU and the U.S.A.](#)

We must look at these examples as evidence of a win-win for all supply chain stakeholders, including those in the head office. Comparably to how businesses attempt to empathise with their customers to develop desirable, feasible, and viable products and services, fashion brands must do the same with the workers within their ecosystems if they are to build holistic solutions that stand up to the rigour of not only new laws and regulations but dramatic changes to our natural environment also.

EMPOWERING FASHION SUPPLY CHAIN WORKERS THROUGH TECHNOLOGY

For fashion brands and retailers just beginning to open their eyes to the potential of cross-collaboration within supply chains, technology will undoubtedly play a crucial role in how they begin to empower their own supply chain workers.

From digital upskilling, data-driven monitoring and reporting, to the digitisation of distribution, solutions exist and can be leveraged by brands at every aspect of the supply chain.

FROM FARM TO FABRIC

Regenerative farming is the practice of working with nature through processes that allow natural resources and biodiversity to replenish instead of deplete. While [regenerative fashion has long been a luxury status symbol](#), increasing climate pressures paired with more discerning sustainability expectations promises to make regenerative systems more commonplace throughout the entire industry.

For example, knitwear brand [Sheep Inc.](#) – previous winners of the Equator Initiative – have developed a carbon-free collection that uses regenerative agriculture to showcase Indigenous people's important role in the climate, biodiversity, and sustainable agenda. The collaboration is an excellent case study in the power of trusting the perspectives of those who understand their land or craft better than anyone else. And the broader shift to regenerative farming is a rich opportunity for just this.

[Climate Farmers](#) – an organisation championing European regenerative farming – boldly state that they are “for the farmers,” centring them in their push towards a sustainable agricultural industry and respecting their roles in society as “stewards” of the land to be passed onto future generations. They argue that regenerative agriculture can help farmers build resilience in their ability to financially profit from their land while benefiting the environment.

AgriTech solutions such as [Lentara Africa](#) are vital levers to realising these outcomes. The solution provider uses satellite-based crop analysis to monitor soil health, water stress, crop nutrition and disease, to give farmers a clearer picture of their land.

Data-driven predictive modelling takes this a step further, helping farmers manage weather impacts through early warning of extreme weather events and crop selection. Then, there are tools such as the [Soil Association Exchange's dynamic benchmarking](#) that allows farmers to use real-time data to analyse their land comparatively against other farms, helping them make informed decisions for a more resilient business model.



IT IS SHOCKING TO BE REMINDED THAT 11 YEARS ON FROM THE RANA PLAZA DISASTER, HUMAN RIGHTS ABUSES ARE STILL PREVALENT IN FACTORIES ACROSS THE GLOBE.



Slightly further upstream, where raw materials are transformed into textiles sit organisations such as [Resham Sutra](#). The social enterprise has developed solar-powered silk reeling that not only reduces the power used in weaving silk textiles but also increases the productivity of rural women in India. This could allow them the potential to earn more money working hours whilst putting environmental and human well-being on an equal footing.

What encapsulates all of the solutions in the prioritisation of people. It is clear that when we safeguard the economic prosperity and well-being of individuals in these roles, sustainable impact is a by-product.

FROM FABRIC TO FASHION

And this speaks to the essential need for financial literacy and empowerment for garment workers.

[Agam International](#) is a Fintech solution for garment workers in Bangladesh – a region that relies on garment production economically. Agam provides nano-loans with the support of partner brands who understand the need to uplift these key workers as human beings, not cogs in production machines, and probably recognise that this leads to better brand reputation and profitability.

Earlier this year [ACT](#) – an agreement between brands, retailers, and trade unions to achieve living wages for garment, textile and footwear workers – announced a groundbreaking individual binding agreements in Cambodia. The approach of introducing wage scales allows for more workers to operate in more stable environments and develop their skills, in addition to factories being able to compete on factors outside of pricing, such as product innovation, quality, and longevity. Qualities that more sustainable garments are built upon.



While these are positive examples moving us in the right direction, it is shocking to be reminded that 11 years on from the Rana Plaza disaster, human rights abuses are still prevalent in factories across the globe. Just last month, [Shein admitted to finding child labour in their supply chain](#), reflecting the fundamental need for collective bargaining agreements in the fashion industry and transparency in their operations.

Technology can be a powerful tool in the fight against such illegal practices. [Supply Trace](#) and a brace of similar solutions, for example, claim to track goods from companies to regions with high risks of forced labour. Platforms like this combine machine learning and on-the-ground data to build correlations that signpost to such practices.

Uncovering these environments is paramount to ensuring workers are treated with the baseline conditions that any human being deserves. Garment workers continue to report toxic levels of chemicals, improper equipment and machinery, and attempts to undermine their freedom of speech. This makes solutions like [WOVO](#) essential – the platform connects workers, suppliers, and buyers, allowing for transparent and, when needed, anonymous communication.

FROM WAREHOUSE TO HOME

Integrating digital tools, however, must be approached strategically. Last year, warehouse workers ironically [described working conditions as non-human](#), as AI is increasingly used to monitor and measure employee performance.

While introducing technology in distribution clearly benefits businesses, the relationship between workers and these digital tools will be most important for success. With warehouse employees having high turnover rates – [46.1% in the US](#) – this will be a challenge, especially as retailers move towards greener warehouse practices.

Skilled and experienced workers will become increasingly necessary within operational strategies to reduce emissions upstream making it fundamental that retailers begin making these more desirable places to work.

UPSKILLING ON THE PATH TO EMPOWERMENT

So why aren't these solutions being embedded more widely?

I could spend hours attempting to unpick the inner workings of the polarity between a brand's planet and people-focused strategies, but in the simplest terms possible - it comes down to the need for investment, whether financial, operational, or the resource of upskilling key workers.

Owen Hewlett, Chief Technical Officer at The Gold Standard Foundation – a certification of numerous methodologies, guidelines, requirements and rules used to measure and report on the positive impact of climate and development initiatives – explains their stance, “GS seeks to foster and support innovation rather than to prescribe. It is important to maintain access for all participants, however, including those for whom advanced technologies may not yet be available.”

When fair access is a fundamental component of empowering fashion workers, businesses and organisations must invest in upskilling as a vital tool supporting garment workers to navigate environmental hurdles through technology. Closing the skills gap will become increasingly essential for brands if they are to begin designing their way out of the climate crisis.

[H&M foundation has recently taken action by working with Shimmy Technologies to enhance the digital abilities of female garment workers](#). Not shying away from the harsh truths of a more digitised and automated future supply chain, the brand's choice to empower these workers is a refreshing approach to advancing their supply chain alongside people.



INTEGRATING DIGITAL TOOLS MUST BE APPROACHED STRATEGICALLY.



CREATING CHANGE

The need for more upfront investment speaks to the focus and prioritisation of profit within the fashion industry. Many businesses may need increased and more immediate ROI to shift towards such practices and initiatives.

New regulations, however, are beginning to make sustainable and ethical practices legal requirements, leading to a shift in industry responsibility for Scope 3 emissions. This could eventually incentivise brands to invest in their broader ecosystems of their supply chains.

We've already passed the point of expecting consumers to take on the responsibility of campaigning for more ethical practices with their spending habits. While sustainability is a desirable and deciding factor for many customers, we cannot put the onus on consumers to make better decisions when brands offer up temptation on a plate laced with aspirational promises at low prices.

Consumers are awake to the consequences of buying fast fashion, yet, brands such as Shein — whose business model is to undercut the competition on price — [have seen their profits soar this year](#).

This is an uncomfortable yet unsurprising aspect of fast fashion; just take a look at the thinly veiled [SNL skit featuring Jake Gyllenhaal](#) that pokes fun at the unethical practices that take place within the Chinese fashion giant “Xiemu”. As someone with an avid interest in consumer behaviour, I am fascinated by the farcical reality it represents.

Many of us can lament fast fashion practices in one sentence, then swiftly move on, considering what we will inevitably buy from them in the next.

Maybe it's because consumers feel dissonance with practices taking place outside of their own experiences as they struggle to make ends meet within a cost-of-living crisis. The thought of luxury on a budget is often too enticing to ignore. [A recent report found that adults living in the least deprived areas of England were more likely to report having made some changes to their lifestyle to tackle climate change \(70%\) than those in the most deprived areas \(55%\).](#)

Perhaps there is a misdirection of trust consumers have with brands to rule out archaic practices like slavery and child labour. Or maybe we expect the laws, legislations, and regulations of the 21st century to restrict such practices.

While the burgeoning number of tech solutions providing opportunities for empowerment are positive, it will take pressure from policy-makers, legislators, and governments to catalyse change – and brands take action.

But I believe there must be a balance between a personalised and nuanced approach underpinned by the standardisation of laws and regulations that allow brands to operate within their own contexts.

Hewlett, elaborates on the need for a personalised approach: “..different sectors contribute to the climate crises in different ways, have different transitional priorities and contribute to other areas of development and security in different ways. Recognising these differences as well as interpreting accounting and target setting rules in a way that is understandable by different sectors is important to both uptake and ambition.” It is essential that brands view their supply chains as living, breathing systems made up of very real people and ever-changing scenarios if supply chains are to be safeguarded.

As we edge towards 2025, it's almost unbelievable that human rights abuse is still happening and the people that contribute to the production and distribution of our clothes are overlooked. One thing is for certain: accountability from brands cannot come quickly enough and disruptive change will need to arrive swiftly

The fashion industry must educate farmers to use new technologies, enable weavers to work more productively, give garment workers a voice, and use automation alongside warehouse employees on the journey to saving the planet.



THE SPIRALING ENVIRONMENTAL COST OF E-COMMERCE RETURNS

ALONGSIDE THE HEADLINES VILLAINIZING FAST FASHION, THE SCALE OF THE PLANETARY COST OF INDUSTRY-WIDE HIGH RETURN RATES HAS BEEN COMING INTO FOCUS. HOW DID WE GET HERE? AND WHAT WILL IT TAKE FOR FASHION TO MOVE THE NEEDLE AND REALIZE SUSTAINABILITY DOESN'T HAVE TO COME AT THE COST OF BUSINESS GROWTH?



By Sylvia Ng
**CEO
ReturnBear**

Sylvia Ng is the CEO of [ReturnBear](#), Canada's first nationwide returns drop-off network, now expanding globally to offer direct-to-consumer brands Amazon-style instant refunds. With over 18 years in tech, including leadership roles at Shopify, Google, and eBay, Sylvia is on a mission to not only cut return costs but also reduce emissions—helping brands slash both by over 40%. Sylvia has held past roles at eBay and Google, and most recently was a General Manager at Shopify where she worked on products to help early stage e-commerce merchants grow their businesses. In conjunction with her current role, Sylvia is also the founder of Amidira, a Toronto-based startup helping patients and caregivers fight cancer through gift boxes and lifestyle content. Sylvia is an active speaker at tech industry events such as Elevate, Women in Product, SMX, and Big Data Toronto, and was named one Canada's Inspiring 50 Women in STEM, WeWorkingWomen's CEO of the Year, and DMZ's Women of The Year.

As online shopping continues to become easier, faster, and more ubiquitous, customers have come to expect that convenient (often free) returns are an essential part of the e-commerce experience. Amazon reinforces this expectation by allowing customers to get instant refunds at return locations quickly, no questions asked, and for free. Meanwhile, brands and retailers have been grappling with the complex issue of returns in their digital channels. The volume of online sales has been promising, but the hidden costs of returns eat into profitability. The real challenge lies in prioritizing the time, resources, and energy needed to improve the returns process. Many companies struggle to allocate focus to this area, despite its significant impact on their bottom line and customer satisfaction. This hesitation to address the returns problem head-on stems not from complacency, but from the daunting nature of overhauling established systems and competing priorities within retail organizations.

The act of buying online with the assurance of easy returns has become deeply rooted in modern e-commerce. It's common for shoppers to order various sizes or styles, planning to return what doesn't fit or suit them perfectly, without a second thought. This is what's called "bracket buying." Retailers who put more friction between transactions and returns face the reality that consumers who want that flexibility will often shop elsewhere.

But this level of convenience comes with a less-talked-about, but spiraling environmental price tag that the industry now needs to reckon with. I know this because, in my time working on improving online returns and reverse logistics, I have seen firsthand how easily high return rates can undermine a brand's sustainability efforts and exacerbate the growing climate crisis. However, the growing scrutiny on these issues presents an opportunity for brands to take action that benefits both their bottom line and the environment. By implementing efficient reverse logistics and sustainable return processes, retailers can reduce their ecological footprint while also improving operational

efficiency. This approach addresses environmental concerns and can positively affect businesses, customers, and the planet. Ultimately, sustainability and profitability in retail are not mutually exclusive; they can work in tandem to create a more responsible and thriving industry.

THE SHAPE AND SCOPE OF THE PROBLEM

According to insider estimates, 20-30% of online purchases are returned, compared to 9% of items purchased in physical stores. While some retailers encourage shoppers to return online purchases to brick-and-mortar stores, most online returns come back to the retailer via traditional reverse logistics (post and courier), directly impacting the carbon footprint of the company receiving the returns. Estimates that up to 24 million metric tons of CO2 emissions can be attributed to industry-wide e-commerce returns each year, according to a recent study from [Optoro](#).

The emissions associated with returns are particularly alarming when one considers that many items, especially apparel, travel thousands of miles before reaching a customer. When those items are sent back to the original distribution center, the carbon footprint of the product journey can double or even triple.

Packaging waste is another environmental consequence of returns. When a product is returned, it often involves additional boxes, plastic wraps, tape, labels, and packing materials—most of which are single-use and inevitably add to the volume of waste already generated by the original outbound shipment. In many cases, customers repackage returned goods. So the goods are in good shape when received for a refund, which inevitably adds to the volume of waste already generated by the original outbound shipment.

One of the more difficult impacts to appreciate is the eventual journey of returned products. Shoppers tend to assume that returned items go back on the shelf (physical or virtual) to be resold...and certainly, this is what we should all hope happens. However, the reality is different. In many instances, returned goods are deemed unsellable due to damage during shipping, the seasonality of the item, or if the cost of inspection and repackaging ends up outweighing their resale value. These products are frequently discarded or sent to liquidation, and many eventually end up in landfills.

CleanHub reports that companies sent over 9.5 billion pounds of returned products straight to landfills in 2022 alone, saving the labor required to bring them back into circulation, but paying a different price in emissions and waste.

EVOLVING CONSUMER ATTITUDES

Consumer behavior also plays a key role in the return lifecycle. Increasingly, shoppers express a desire to support sustainable brands and make eco-friendly choices. McKinsey & Company reports that **66% of customers** want to shop more sustainably. However, despite their best intentions, shopper return habits often tell a different story. While research continues to suggest consumers are increasingly aware of sustainability issues, the convenience of free and easy returns creates a disconnect between their values and actions.

For brands and retailers, this creates the illusion that there's a tension that requires reconciliation. As more and more companies fall under the scope of disclosure requirements and regulations that mandate transparency and extended-lifecycle impact modeling, those same companies will seek every possible avenue to cut their emissions. But at the same time, they'll need to shore up profitability - and the prevailing belief is that profit is at odds with sustainability, especially if customers stop purchasing from them because they begin charging for returns or restricting the convenience of sending items back in other ways.

The only way to move the needle here is for brands and retailers to realize this isn't an either-or situation. Optimizing return transportation lines, keeping products



local for resale after being returned, consolidating shipments, and validating returns early in the return journey improve customer convenience while reducing retailers' costs and emissions. From what I see as CEO of ReturnBear, retailers who delve into the possibilities and take the time to invest in change can gain at least 30-50% on return costs while cutting emissions by as much as 40%.

INNOVATIVE SOLUTIONS IN REVERSE LOGISTICS

The fact remains that brands need to sell their products and want to expand to new markets, where the frontiers of pricing, fit, color, and more will be continually tested. The industry will not be able to accomplish this without keeping the gates open for returns.

Innovative solutions already exist so that retailers can have it all, and technology has an important role to play in several different areas.

Some solutions help brands tap into the re-commerce movement by listing returns on resale marketplaces so they can find new homes instead of going to landfills. Others provide software that enables third-party logistics providers (3PLs) and warehouses to process returns as effectively as they manage their outbound shipments, and to get items back in stock and selling again without involving the brand directly. Besides reducing product waste, brands can extract more revenue from their returns by selling them again, even at a reduced price, through partnership strategies, which will plug into brands' resourcing and stock-keeping systems.

Rethinking packaging design is another overlooked way brands can minimize waste. Companies innovating in the packaging space are emerging, developing branded packaging options that can be recovered from customers and reused multiple times, instead of defaulting to single-use materials. This can help reduce the materials used in each transaction, both for the initial sale and the return and create a unique opportunity to connect a brand's identity to its packaging in novel ways that are better for the planet!

At ReturnBear, our approach has been to provide services across a returned product's entire journey to compress the cost, time, and distance traveled by that return. Our approach provides reverse logistics services for brands in markets worldwide where the brand doesn't have local operations of their own. We can receive returns locally, process them quickly for customers to get fast refunds, reduce fraud by verifying item accuracy and quality, and then consolidate returns before shipping them back to our brand partners. Minimizing shipments through consolidation has a particularly positive effect on carbon emission reduction, and reducing the need for cross border return shipments by keeping products local can improve emissions by as much as 40%. This model also offers brands' improved customer experience (from faster return processing) and increased profitability by lowering return-related costs.

THE ROLE OF TECHNOLOGY AND DATA

Strategically deploying technology and data analytics can also play an important role in mitigating the environmental impact of e-commerce returns. Many merchants don't know the true impact of returns on their business, and you can optimize what you can't measure. Data can help on many fronts, from route optimization to calibrating product mixes, to reduce the incidence of returns in the first place.



For example, if a brand stays on top of its return data thanks to a machine learning model surfacing relevant insights at the right time, then predictive analytics can be used to reduce returns before they even happen. This might include providing more accurate product descriptions and imagery, publishing better sizing guides, or piloting virtual try-on technology for apparel, all of which can help customers make more informed decisions and reduce the likelihood of returns.

As we're already seeing, AI and machine learning can also assist in a host of ways. AI-based chatbots for initiating returns are starting to make their way onto the scene. And machine learning can route returned goods to more optimized locations or processing centers, reducing the distance traveled and the associated emissions. Smart inventory management, powered by a brand's own data, can ensure that returned items are inspected, repackaged, and re-shelved more quickly, reducing waste and improving profitability. Pairing this with the capabilities of partners who can execute the mechanics of reverse logistics more quickly will help dent both the cost and the footprint of those returns.

POLICY AND INDUSTRY INITIATIVES

As important as voluntary brand action and shifting consumer behavior will be, more than these forces will be needed if we're to move the needle.

Industry-wide initiatives and government policies will still be required to promote and then mandate sustainable commerce practices. Some governments are already exploring regulations limiting the environmental cost of returns, such as placing stricter guidelines on how products can be disposed of (as is the case in extended producer responsibility regions) or requiring transparency around return-related emissions.

Industry-led initiatives are also emerging to promote more sustainable returns. These include collaborations between retailers, logistics companies, and sustainability organizations to develop new best practices and share innovations. If we combine our efforts, build shared networks, and embrace the tools and technology to optimize a given return's lifecycle, we stand the best possible chance of setting new standards for the entire e-commerce ecosystem and operating profitable businesses simultaneously!

CONCLUSION

For the foreseeable future, returns will be an inevitable byproduct of sales growth in e-commerce. Convenient and cost-effective returns are a modern consumer expectation and a key motivator for shoppers to make purchase decisions, which don't need to be at odds with brand profitability and sustainability. Simply put, if we fail to meet demand and fail to implement suitable solutions for all stakeholders, the current free and easy returns model will become more unsustainable than it already is.

Amazon's free, instant refund return locations are setting new global consumer expectations, leaving brands scrambling to adapt. By recognizing the impact of returns on transportation emissions, packaging waste, and product disposal, companies must swiftly implement changes to optimize reverse logistics. Crucially, brands need to focus on reducing returns through improved design, development, sizing, and production strategies. Those who fail to address these challenges risk becoming obsolete in the rapidly evolving retail landscape. To remain competitive, brands must act now to meet rising consumer demands and environmental concerns, or risk becoming retail dinosaurs in an increasingly demanding market.

Consumers also have an opportunity today to align their return habits with their sustainability values. Educating them and providing services that they can embrace as convenient and better for the environment will be a key brand responsibility that helps balance the scales.

Perhaps the time is upon us to create and elevate the chief return officer role, which would provide focus, visibility, and control across the return lifecycle and complex chains of reverse logistics. With that kind of dedicated oversight, the right partnerships, and a focus on excellence after a product has been sold, we can create a future where the convenience of online shopping coexists with a commitment to protecting the planet.





WHAT CHINA'S SUSTAINABILITY EFFORTS MIGHT MEAN FOR GLOBAL FASHION

DECODING THE
CONSUMPTION AND
PRODUCTION TRENDS OF
CHINA'S FASHION MARKET
FOR 2024.



By Gemma A. Williams

**Fashion writer, curator
and China consultant**

Gemma A. Williams is a fashion writer, curator and consultant specialising in the China market. Her publication *Fashion China* (Thames & Hudson) was launched at Shanghai Fashion Week in 2015. She has worked with Condé Nast Shanghai, and *Jing Daily*, and now contributes to *Vogue Business*, *Forbes*, *South China Morning Post* and the *Business of Fashion*.

When it comes to sustainability, China is a unique case. Across the west, governments have begun to reset and in some cases abandon their own state-level green initiatives — often in direct opposition to prevailing electoral sentiment — as short-term shocks take precedence.

Beijing, by contrast, likes to play the long game. In an inversion of its global counterparts, China's relationship with sustainability is that of a country with significant government policy but low consumer demand. (There is a parallel here in Beijing's attempt to shift economic focus from housing to complex technology: an investment in future prosperity, no matter how difficult.)

As a direct result, China has seen a surge in green innovation. Through legislation, a strategic vision for carbon neutrality by 2060, clean energy initiatives, and private sector incentives, the country is building a framework of sustainable solutions that is gearing up to shape consumption. As such, there are three trends within China's fashion market that will drive future demand and, over time, influence global attitudes given the country's scale and role in the supply chain.

These are circularity: the appearance of new retail spaces and events; and, most importantly, the uptake of alternative materials. And the way these trends develop may have an influence on how other regional attitudes to, and industry investments in, sustainability shape up.

CIRCULARITY AND RESALE

First, sustainability initiatives must reconcile the economy's dependence on growth built upon finite resources. Sustainability cannot be decoupled from commercial success. One popular approach to this challenge is the promotion of circularity, which has become a key concern of Beijing in recent years. The government's 14th Five Year plan aims, by 2025, to achieve the repurposing of 25% of its textile waste and annual production of two million metric tons of recycled fibre.

Dr. Christina Dean, founder of NGO Redress, which works to promote circularity, and CEO of The R Collective — a social impact waste business that works to reduce waste — believes this to be cause for optimism. "This waste 'crisis' is an opportunity to establish a circular fashion economy — a system where materials never become waste, nature is regenerated and responsibility is taken for the product's entire lifecycle and its impact on the planet — thanks to this abundant, perpetual flow of 'waste' materials coming from consumers and industry alike."

The Sustasia Fashion Prize, launched by Shanghai Fashion Design Association (SFDA) and sustainability agency yehyehyeh in September 2024, aims to promote sustainable practices and accelerate innovation in the fashion industry in China and Asia more widely. The brand new award encourages young designers in this region to use sustainable, innovative materials and production processes, by offering industry and financial support.

And this support is translating into new attitudes for everyone from designers to shoppers, who, according to Dean, can't get enough: "They appear to be flocking to second-hand clothing purchases as if their (fashion) lives depended on it." Indeed, championed mainly by high- and medium-income groups — under the encouragement of fashion influencers and media — the resale clothing market in China has been growing steadily.

According to a report by iResearch, China's second-hand luxury market in particular is predicted to jump from around \$8 billion in 2020 to \$32 billion in 2025. A combination of factors from changing attitudes during the pandemic, a shift in opinion around second-hand goods, and more conscious consumption is contributing to this rise.

This uptake is part of a wider trend in the growth of the sharing economy in China: from ride-hailing to bikes, umbrellas, and power banks, second-hand consumption has been gaining in popularity among young people. Gen Z and Millennials together account for more than 80% of the total number of second-hand luxury customers. As these demographics age, this will only become more prevalent resulting in a drop in demand for new goods, a rethinking of how to rescue existing objects and garments, and a necessary reprioritisation amongst brands of their different revenue streams.



EVENTS AND RETAIL SPACES

This growing consumer interest in sustainability can be seen in several recent openings and events — and the positivity with which they have been received.

Take menswear label Youngor, which has always been known for its eclectic investments. Even with this reputation, the company still managed to turn heads with the launch of HAI550, China's first sustainable lifestyle commercial space. Spanning 8 stores and 7000 square metres in Shanghai, the centre includes pop-ups, galleries, spaces for influencers to film — as well as housing emerging labels dedicated to sustainability. Fun, engaging, and experience-focused, the building walks the walk: built by sustainable methods with reclaimed materials and energy-saving initiatives.

Also in Shanghai, Earth Day saw local sports giant ANTA launch its new carbon-neutral boutique. Like HAI550, ANTAZER is a fiercely cross-disciplinary space — featuring installations alongside products as well as providing workshops and literature on green issues. Dan Cui, the sustainable fashion consultant behind the project, is keen to emphasise the space's multidimensionality: that it's not just about designers and fashion. "Sustainability here becomes not so much an endpoint as a beginning: of a conversation about what retail could one day become," he says.

Indeed, conversations such as these are a key part of this trend. Shanghai Fashion Week Organisation has pioneered the growth in sustainability-led events across the last decade, most recently by developing its Ulio space (also devised by Cui) that brings these issues to the general public. Again, discussions were in no short supply at the GREENEXT expo, an event that gathered together the entire fashion ecosystem over two days to, in the words of Rethink Fashion founder Dominique Simard, "accelerate the transformation of the industry, develop awareness and trigger collaboration, and concrete actions."

The focus on cross-pollination between disciplines was well-received by fashion professionals and consumers alike. Running across two days in August 2024, the event attracted 4,306 attendees, including leading global companies, innovators, and industry experts, who comprised, in the words of founder Dr. Hong Zheng, "a sustainable community where partners can share, exchange, and inspire each other, empowering enterprises to enhance both their commercial and social value." These included big names like fashion brands JNBY, Shokay, Canopy, Idole, On the list, Esquel, RESET, Polymateria, and the charities Act Asia and Redress.

The fact that shoppers are showing up for such discussions — and patronising spaces for them to take place — demonstrates a significant change in consumer sentiment, one that is at last catching up with government planning.



REGENERATIVE AND ALTERNATIVE MATERIALS

When it comes to alternative materials, consumer interest in scientific innovation is also notable. “Chinese luxury consumers,” Chen affirms, “love high-tech products, regenerative materials, and next-generation fibres.” But such demand is useless without supply. Innovation in sustainable material still suffers — the world over — from the issue of scalability. If China can crack this disconnect, it would put the country in a position to make the most of the global green economy.

There are several signs that it may be on its way to doing so. Beijing's PhaBuilder, for instance, is a pioneering synthetic biology company specialising in eco-friendly alternatives to traditional plastics. The startup has garnered substantial support (including three rounds of financing and a selection of strategic partnerships with industrial leaders), which has in turn translated into positive market feedback. It's not alone — BloomGEM, a pioneering company in biological dyeing based in Shenzhen is currently garnering significant attention from both Chinese and American investors. And then there's bio-based leather producers Synmetabio 始如. To validate mass production, the company has established the world's first carbon-negative bio-based leather manufacturing plant in Changzhou, with an expected annual production capacity of 5 million metres by early 2025.

Together, these show how public sector mandate has translated to private sector capital: in China, the investment growth rate is around 20% to 30% annually, while in the U.S., investments in sustainable materials are growing at about 15% to 25% per year. With the support of these capital inflows and the fashion industry's increasing focus on sustainability, the market is maturing — and China is potentially putting itself on the front foot from both a sustainable production and sustainable consumption perspective.

Yidi Chen is the Gen Z founder of Matters, a material-driven agency in Shanghai that focuses on bringing responsible bio-based innovation to fruition and enabling forward-thinking businesses to reach their ESG goals starting with materials. She believes that this represents a crucial milestone. “Globally, China may not be widely recognized for its innovation in next-generation materials, but its manufacturing capabilities should not be underestimated,” Chen explains.

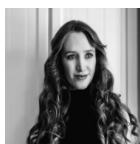
She believes that the existing supply chain and manufacturing expertise in China has the potential to “effectively scale these well-known material technologies.” The significance of this can't be overstated when every market is moving in the same direction, but some are moving faster than others.

Such a paradigm shift draws immediate historical parallels, especially when Chen notes how the sustainability and carbon reduction race is often compared to the space race. History will not necessarily repeat itself — especially absent the right western investment into sustainability education, consumer behavioural change, support for new business models, and wide-scale industrialisation of new methods and materials. If the country is able to blend these different streams effectively, China could emerge as a leader in sustainability, ahead of other regions that are — at least on paper — more synonymous with sustainability regulation.



FASHION AND TEXTILES LEGISLATION: LAYING DOWN THE KEY LAWS

AN ESSENTIAL GUIDE TO IMPORTANT FASHION
AND TEXTILES SUSTAINABILITY REGULATIONS.



By Emma Feldner-Busztin
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THE INTERLINE

Emma writes about how technology is shaping our world and how global trends and patterns will impact the fashion industry. She currently serves as The Interline's News and Features Editor.

Crises, compliance, and the need for critical and creative thinking

Fashion and textiles legislation has generally come to be viewed as one of the major solutions to the industry's environmental and ethical crises. There are two primary reasons for this: a sheer volume of new laws (particularly from the EU,) and the fact that many regulations across the EU, UK, and US impose stringent requirements aimed at reducing waste, preventing exploitation, and pushing fashion businesses to rethink their entire approach to product creation, sales, and disposal.

Regulations are pushing the sector to adapt, innovate, learn, and unlearn in a global market that is experiencing unparalleled challenges when it comes to the climate, consumer behaviour, and technological advances. For brands and retailers, manufacturers, government bodies, activists, and consumers alike, the stakes have never been higher.

It's worth pointing out that the EU in particular has accelerated their activity when it comes to sustainability. This is largely because, until recently, this sector was largely unaccounted for and uncaptured by existing legislation - being left to self-regulate.

In 2014 - a quick reminder that that was already a decade ago! - leaders recognised that the EU needed to go further to transform Europe into the highly energy-efficient, low-carbon economy the future demands. The EU and its member states rolled out a series of initiatives aimed at addressing key environmental issues: from reducing carbon emissions and tackling water pollution, to managing chemical toxicity and waste. These efforts often singled out specific industries, providing frameworks for compliance.

But the first significant piece of EU legislation specifically targeting the fashion and textiles industry was the Strategy for Sustainable and Circular Textiles, which was launched in March 2022. And many of the new measures (contained across almost 20 new laws) are set to affect fashion's operations without offering clear guidance on how to comply.

Nonetheless, the following pieces of legislation are critical for fashion professionals to have on their radar - to learn, to understand, and to think critically about and engage with.

EU REGULATIONS

CORPORATE SUSTAINABILITY DUE DILIGENCE DIRECTIVE (CSDDD)

Status: In force since the 25th of July 2024

ACCESS LINK

This Directive's aim is to create sustainable and responsible corporate behaviour in companies' operations and across their global value chains. The new rules will ensure that companies in scope identify and address adverse human rights and environmental impacts of their actions inside and outside Europe.

The companies in scope are "large EU limited liability companies and partnerships" with more than 1000 employees and €450 million turnover (net) worldwide. Also in scope are large non-EU companies with €450 million turnover (net) in the EU.

Member States have to transpose the Directive into national law and communicate the relevant texts to the Commission by 26 July 2026. One year later, the rules will start to apply to the first group of companies, following a staggered approach (with full application on 26 July 2029).

CORPORATE SUSTAINABILITY REPORTING DIRECTIVE (CSRD)

Status: In force since the 5th of January 2023

ACCESS LINK

The CSRD modernises and strengthens the rules concerning the social and environmental information that companies have to report. A broader set of large companies, as well as listed SMEs, will now be required to report on sustainability. Some non-EU companies will also have to report if they generate over €150 million on the EU market.

The new rules ensure that investors and other stakeholders have access to the information they need to assess the impact of companies on people and the environment, and for investors to assess financial risks and opportunities arising from climate change and other sustainability issues.

The first companies will have to apply the new rules for the first time in the 2024 financial year, for reports published in 2025.

ECODESIGN FOR SUSTAINABLE PRODUCTS REGULATION (ESPR)

Status: In force since the 18th of July 2024

ACCESS LINK

The ESPR aims to improve the circularity, energy performance, and other environmental sustainability aspects of products placed on the EU market, and is part of a package of measures that are central to achieving the objectives of the [2020 Circular Economy Action Plan](#) (CEAP). For more context, the CEAP is one of the main building blocks of the [European Green Deal](#) that aims to set the EU on the path to a green transition, with the ultimate goal of reaching climate neutrality by 2050.

The EU now requires products to have a Digital Product Passport (DPP), a so-called “data carrier” that can take the form of a QR code, RFID tag, or other form of scannable technology. It will allow custom authorities to perform automatic checks on the existence and authenticity of the DPPs of imported products. This information can include: a product’s technical performance, materials and their origins, repair activities, recycling capabilities, and lifecycle environmental impacts.

The ESPR also has new rules to address destruction of unsold consumer products: banning the destruction of unsold textiles and footwear, and opening the way for similar bans in other sectors, if evidence shows they are needed. It will require large and eventually medium-sized companies across all product sectors to disclose annual information on their website, such as the number and weight of products they discard, as well as their reasons for doing so.



EU TEXTILE LABELLING REGULATION REVISION

Status: In progress

ACCESS LINK

As part of the Circular Economy Action Plan (CEAP), the European Commission is in the planning stages for a revision to the existing EU Textile Labelling Regulation. The revisions are anticipated to require inclusion of sustainability and circularity disclosures, and to align the requirements of the existing Regulation with the recently adopted Ecodesign for Sustainable Products Regulation (ESPR).

The existing Textile Labelling Regulation has already long required importers and manufacturers of textile products on the EU market to specify the fibre composition of the products using a defined list of standardised names, and to disclose whether the product includes non-textile parts of animal origin. As member states have added overlapping labelling requirements on other issues in recent years, and as product labelling further expands under the ESPR, the Textile Labelling Regulation must be amended to conform and simplify matters for retailers.

GREEN CLAIMS DIRECTIVE

Status: In progress

ACCESS LINK

With this proposed new Green Claims Directive seeks to: (i) increase environmental protection and accelerate the green transition; (ii) protect consumers and companies from greenwashing; (iii) improve the legal certainty as regards environmental claims; and (iv) boost the competitiveness of economic operators that make genuine efforts to go green.

Under this Directive, companies of all kinds will need to adhere to specific guidelines and standardised criteria when making green claims for greater clarity and trustworthiness.. These claims will require independent verification and must be supported by scientific evidence - generic statements like "eco-friendly" won't suffice anymore. Currently, the EU has over 200 sustainability labels, many with overlapping or contradictory standards. Some rely on self-certification, making them unreliable and confusing.

WASTE FRAMEWORK DIRECTIVE REVISION

Status: In progress

ACCESS LINK

Following a thorough analysis including stakeholder consultations, the EU Commission has proposed a targeted amendment of the Waste Framework Directive, with a focus on textiles waste. The proposal aims to bring about a more circular and sustainable management of textile waste, in line with the vision of the [EU Strategy for Sustainable and Circular Textiles](#) (that implements the commitments of the [European Green Deal](#), the [Circular Economy Action Plan](#) and the [European industrial strategy](#).)

Under current [EU rules on waste](#), Member States are required to set up separate collections of textiles by 1 January 2025. For this to happen, separate collection, sorting, re-use, and recycling capacities within the EU have to be strengthened. This requires significant investments to build infrastructure, and to develop new technological solutions.

In particular, the Commission is proposing to introduce mandatory and harmonised Extended Producer Responsibility (EPR) schemes for textiles in all EU Member States. EPR schemes require producers to take responsibility for the entire lifecycle of their products, in particular at the end of the product's life. Under the proposal, the level of the financial contributions of the producers will be based on the circularity and environmental performance of textile products (referred to as "eco-modulation").

To reduce illegal waste shipments to non-EU countries, often disguised as intended for reuse, the Commission's proposal further clarifies the definitions of waste and reusable textiles. This will complement the [proposed Regulation on waste shipments](#), which ensures that textile waste is only exported when there are guarantees that the waste is managed in an environmentally sound manner.



CALIFORNIA SB 707- RESPONSIBLE TEXTILE RECOVERY ACT OF 2024

Status: In progress

ACCESS LINK

The bill establishes an extended producer responsibility (EPR) program that will require producers to implement and fund a program to facilitate the reuse, repair, and recycling of clothing and textile fibres. SB 707, together with the EPR program it establishes, seeks to expand upcycling and recycling markets for clothing and fibres, which have been largely underdeveloped. It also reinforces ongoing state initiatives to promote the repair and reuse of textiles. The bill is anticipated to accelerate the shift towards a sustainable, circular textile economy that aligns with market needs. This will open new opportunities for production and consumption that benefit the environment, while keeping costs low for the state, businesses, and consumers in California.

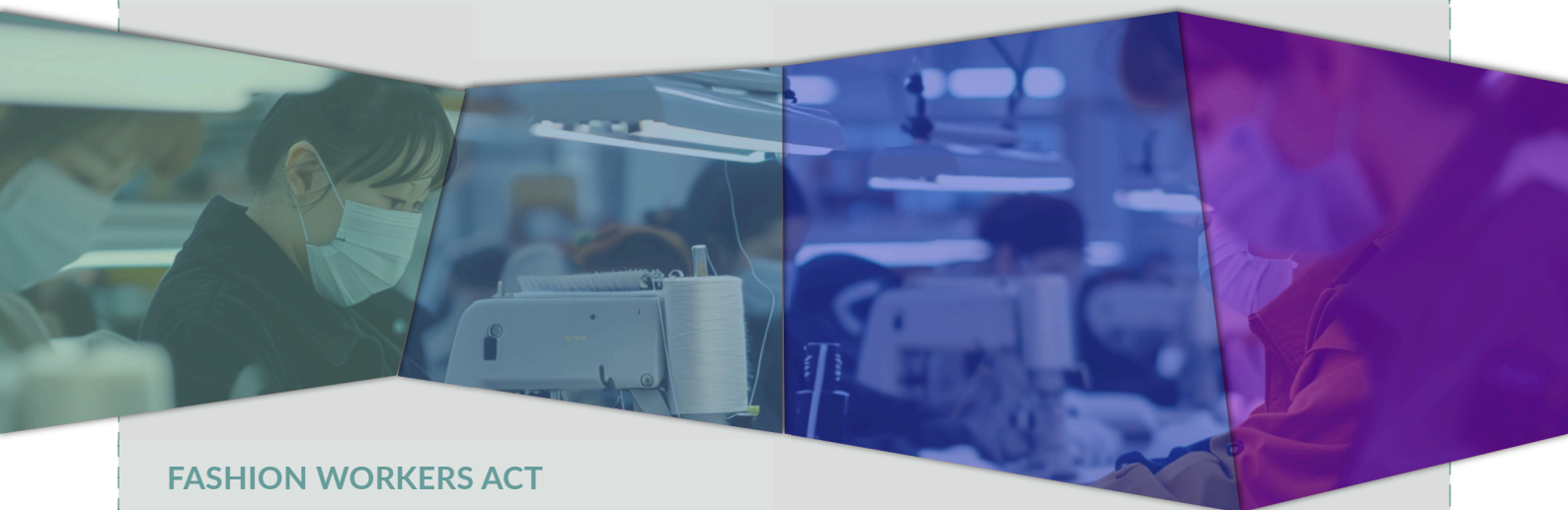
FASHION SUSTAINABILITY AND SOCIAL ACCOUNTABILITY ACT - "THE NEW YORK FASHION ACT"

Status: In progress

ACCESS LINK

Officially introduced as Senate Bill A. 4333-A, the Act requires "fashion sellers" doing business in New York to be accountable to standardised environmental and social due diligence policies, as well as establish a fashion remediation fund. The proposed law would cover any apparel or footwear company doing business in New York with an annual global revenue of \$100 million.

Fashion sellers are mandated to conduct thorough due diligence for all aspects of their business related to wearing apparel, footwear, and fashion bags. This includes mapping their supply chains across all tiers of production, from suppliers to subcontractors, and disclosing pertinent information such as worker demographics and wages. Fashion sellers must also align with international guidelines for responsible business conduct and risk assessment, as outlined by the Organization for Economic Co-operation and Development (OECD).



FASHION WORKERS ACT

Status: In progress

ACCESS LINK

The Fashion Workers Act provides for the registration and duties of model management companies, as well as complaint procedures and penalties for violations. The legislation aims to close the legal loophole by which management companies escape accountability, and create basic labour protections for models and other fashion professionals working in New York's fashion industry.

FASHIONING ACCOUNTABILITY AND BUILDING REAL INSTITUTIONAL CHANGE ACT - THE "FABRIC ACT"

Status: In progress

[ACCESS LINK](#)

The FABRIC Act proposes major new workplace protections and manufacturing incentives to cement the US as the global leader in responsible apparel production.

This worker-led bill also amends the Fair Labor Standards Act of 1938 to include: the establishment of a nationwide garment industry registry through the Department of Labor to promote transparency, hold bad actors accountable, and level the playing field; new requirements which hold fashion brands and retailers alongside manufacturing partners jointly accountable for workplace wage violations to incentivise responsible production; and setting hourly pay in the garment industry and eliminating piece rate pay until the minimum wage is met to ensure jobs with dignity.

HOUSE BILL 2068 - WASHINGTON ACT RELATING TO ENVIRONMENTAL IMPACTS OF FASHION

Status: In progress

[ACCESS LINK](#)

The Washington legislature is set to introduce a policy modelled after the New York Fashion Act, requiring large fashion companies operating in the state to address their environmental impact. This bill mandates public disclosure of environmental due diligence policies, processes, and outcomes.

Key provisions of the bill include a requirement for companies to map at least 50% of their suppliers throughout the entire production process, from raw materials to final products. They must identify and disclose suppliers linked to prioritised risks. Affected companies are also required to implement measures to identify, prevent, and mitigate negative environmental impacts, ensuring their due diligence aligns with international standards. Additionally, starting July 1, 2025, these companies must publish an environmental sustainability report on their websites, detailing the results of their supply chain mapping and due diligence efforts.

US SECURITIES AND EXCHANGE COMMISSION (SEC) CLIMATE-RELATED DISCLOSURES RULE

Status: In force since the 28th of May 2024

[ACCESS LINK](#)

The SEC's final rules reflect the Commission's efforts to improve and standardise climate-related disclosures by public companies and in public offerings. They also reflect the Commission's efforts to respond to investors' demand for more consistent, comparable, and reliable information about the financial effects of climate-related risks on a registrant's operations and how it manages those risks while balancing concerns about mitigating the associated costs of the rules.

Before adopting the final rules, the Commission considered more than 24,000 comment letters, including more than 4,500 unique letters, submitted in response to the rules' proposing release issued in March 2022.



STREAMLINED ENERGY AND CARBON REPORTING FRAMEWORK SECR

Status: In force since the 1st of April 2019

ACCESS LINK

Under the SECR, relevant companies are required to report certain GHG emission and energy consumption information with their annual financial statements. The SECR framework applies to all UK incorporated, quoted companies and large UK private organisations and LLPs, regardless of their sector. A company is defined as "large" if it meets at least two of the following criteria in a financial year: turnover of £36 million or more; balance sheet total of £18 million or more; and/or 250 employees or more.

Reporting obligations include Scope 1 and Scope 2 emissions as well as total energy consumption and at least one emissions intensity ratio. To note, reporting of Scope 3 emissions remains voluntary. There are also numerous distinctions and points of exclusion; for example, if an entity can demonstrate that its energy consumption is less than 40 MWh during the reporting period, no emissions information requires disclosure.

MODERN SLAVERY ACT (MSA)

Status: In force since 29th of October 2015

ACCESS LINK

The MSA sets out a range of measures on how modern slavery and human trafficking should be dealt with in the UK. It requires fashion brands and retailers operating in the UK to report annually on their efforts to eradicate modern slavery throughout their supply chains. Of particular significance for businesses are the requirements of section 54 ("Transparency in supply chains") that require commercial organisations in scope to prepare a slavery and human trafficking statement each financial year.

The requirement to submit an annual slavery and human trafficking statement applies to all "commercial organisations" with a total turnover, including group turnover from subsidiaries, of at least £36 million. This requirement affects organisations that provide goods or services and operate, in whole or in part, within the UK. A "commercial organisation" is defined as any company, regardless of where it is incorporated, or any partnership formed that conducts business in the UK. The 2015 Act clarifies that "business" encompasses any trade or profession.

UK CLIMATE-RELATED FINANCIAL DISCLOSURE (CFD) REGULATIONS

Status: In force since 6 April 2022

ACCESS LINK

The UK Government's mandatory climate change reporting requirements for large UK private companies and limited liability partners (LLPs) has the purpose of climate risk disclosure is to identify risks and opportunities of both the physical and transitional impacts, risks, and opportunities of climate change. The CFD aims to integrate climate risk and opportunities in the business governance, strategy, risk management, and key performance indices. Carrying out CFD can improve how investors view and assist the organisation in complying with new regulation.

Companies in scope will include public interest entities (traded companies, banking companies, insurance companies) and AIM-listed companies with more than 500 employees, as well as private companies with more than 500 employees and turnover of more than £500 million.



PAPER TO PRACTISE: THE AMBITIOUS ACT OF TURNING POLICY INTO ACTION

The sheer volume and complexity shouldn't discourage or stall efforts from fashion businesses. A productive first step is thorough research and staying well-informed - concentrating first on ensuring proper compliance with the regulations currently in effect. For the forthcoming laws, it's advisable, at this stage, to become acquainted with their requirements and begin preparations for future implementation.

Also to hear in mind is that while legislation is certainly part of the bigger picture of solutions, the reality is that progress has been frustratingly slow in an urgent timeframe. As detailed above, many important laws are still in the process of being finalised, and some are only coming into force in the next few years.

But that preparation (and as much positive, practical change) must start now for a guarantee that the next decade will see the implementation of the ambitious sustainability policies, and radical transformation of the industry will take place. Taking the written commitments off the page and into action will require active participation and genuine investment of every one of fashion's stakeholders, today. Yesterday, actually.



SUSTAINABILITY DEMANDS SPEED AND SCALE

WITH AN ONGOING INFLUX OF VIRGIN FIBRES, FASHION'S FOOTPRINT WILL CONTINUE TO GROW. TO MEANINGFULLY CHANGE DIRECTION, BIGGER, BOLDER ACTION IS NECESSARY.



By Dennis Nobelius
**CEO
Syre**

Dennis is currently the CEO of Syre, a new start-up with hyperscale ambitions in circular textiles. Founded by H&M and Vargus, backed by TPG Rise Climate.

Textile waste is a growing global challenge. Less than 1% of the global textile fiber market is coming from recycled textiles, leaving the textile industry far behind others in waste management and circular solutions. The textile industry today accounts for up to 10% of global CO₂e emissions, with polyester being the biggest emitter and fastest growing fiber. Virgin polyester, made from crude oil in refineries, and bottle-to-fiber recycled polyester, are however both linear meaning the majority of all end-of-life products currently end up in landfills or being incinerated. The industry is now at a tipping point as the European Union and other actors are introducing legislation that will regulate textile waste and accelerate demand for circular materials.

So many people would then ask shouldn't we stop producing and using polyester all together. Polyester will however not go away – it is in fact a very strong fiber giving textile products vastly longer life spans as well as offering performance that other fibers simply cannot provide. It is used across industries and in products ranging from airbags and seatbelts to furniture and sports gear. Of course, reducing consumption and optimizing design and production will be key, however the main way we can reduce textile's impact is by extending use. If we can cut polyester's reliance on virgin fossil resources and carbon intense production, we will be able to make use of the features at a much lower cost to the climate.

So what will it take to move the needle, and to drive the green transition needed in an industry lacking large-scale solutions and still too far from sense-of-urgency?

First, to move from innovation to action. There are many great startups and technologies out there, but what is needed now is speed and scale. What has been lacking is true textile-to-textile recycling at global hyperscale, driving the transition from a linear to a circular value chain by putting textile waste to use, over and over again. What has also been lacking is financial muscles and long terms investors to make it happen. Until now. So what do we then mean by hyperscale? For us, it means setting up 10-12 textile-to-textile gigascale plans globally in the coming decade - producing in total 3 million metric tons of circular polyester and achieving up to 85 percent reduction in CO₂e emissions compared to virgin polyester production. It is not enough, but it is a very good start.



Secondly, to accelerate the great textile shift, one key element is collaboration and partnerships. We (= the industry) need to work in a different way versus today to enable true sustainable business happening. We need a handshake between the scale-ups and the brands. Among many things, but most crucial in the form of 'offtake agreements', a binding contract between the brands and the innovators, securing capacity for the brands whilst enabling the scale-ups to secure funding and building the capacity. Our team has mapped hundreds of apparel brands, polyester intense automotive OEMs, and home interior brands, versus the forecasted global capacity of circular material from recyclers. And applied some probability, legislation pressure, and science based target initiatives sign ups – showing a gap of 12 million metric tons by 2030 of supply vs demand gap. We need all hands on deck to deliver.

Last but not least, bravery. For too long, the refrain in the textile industry has been that true circularity is just not ready for prime time, that technology and solutions aren't there yet. But virgin quality materials are now able to be made profitably from waste, at scale, again and again and again. And regulations will increasingly demand it. The future-focused brands are well aware that this textile shift is happening, and realize that very soon circular materials will be locked up by the early movers. Across the value chain, we are beginning to see true leadership happening. This is very encouraging. But we need to move bolder, and faster. Together.

I envision a world where textile-to-textile recycling has become a natural part of our society's infrastructure. Where the textiles we create, use, and throw away are constantly reborn into new, high-quality products. Ensuring an infinite cycle of the past and the future. A world where every textile fiber sees a new day.

For our customers, partners, and investors – but first and foremost, for our planet.



A person wearing a blue hooded garment stands in the center of a large pile of discarded clothing and fabric. The background is a clear blue sky. A large red diagonal band cuts across the image, serving as a background for the title and author information.

UNDERSTANDING OVERPRODUCTION

THE ROOTS OF FASHION'S CORE SUSTAINABILITY CHALLENGE, AND HOW
WE MIGHT TACKLE THEM THROUGH POLICY, TECHNOLOGY, AND
CONSUMER ENGAGEMENT.



*By Darya Badiei
Khorsand*

PhD Researcher
UNIVERSITY OF MANCHESTER

Darya Badiei Khorsand is a PhD researcher in Fashion Management and Marketing at The University of Manchester. She specialises in consumer behaviour in the sustainable luxury fashion segment, and her work for The Interline places a special emphasis on new innovations in sustainable materials.

Overproduction is a thorny problem, and solving it requires all the pieces of the puzzle that have led us here - to a state where fashion routinely creates far more variety and volume than the consumer market or the planet can reasonably sustain - to fit together in a new configuration to find a solution.

To better understand where overproduction originates, the scale of the problem it creates, and what it might look like to begin to reverse it, I wanted to look at three of these key pieces: policy, technology and consumers. To gain first-hand expert insights, I also spoke with Delphine Williot, Policy & Campaigns Manager at Fashion Revolution, and Ganesh Subramanian, founder of Stylumia - a company that provides AI-driven analytics tools, which could play a role in helping recalibrate demand and supply.

Let's start by examining the scale of the problem. It's widely accepted that fashion is one of the biggest industries in the world - one that is a contributor to both environmental and social crises as a direct result of its scale, and one that is on a destructive trajectory with high production volumes that keep on increasing.

What is not known, however, is exactly how many clothes the industry actually produces annually, and, of that total, how many are sold, sent to landfills, incinerated, or otherwise disposed of. This is largely due to the fact that, according to data captured by Fashion Revolution, [89% of brands do not disclose their production volume](#). Estimates suggest that between [80 and 150 billion garments](#) are made every year, 8 to 60 billions of which are not sold. In Europe alone, between [254,000 and 594,000 tones of textiles](#) are destroyed via some method each year. By even the most charitable yardstick, this is a significant amount of overproduction. Between 10% and close to 40% of all clothing is, according to these figures, effectively surplus to the market's requirements. And as any fashion insider will tell you, a full-price sell-through rate of just 50% is now considered fairly common - and while not all of that extra stock is disposed of after being progressively discounted, at least some of it is.

So fashion has, by and large, accepted the idea that drowning in excess products is just part of the business model. But how far will that acceptance stretch if the volume of new product introductions continues to grow at an estimated [3 times by 2050](#)? Even before we get to the sustainability part of the argument, where will the industry draw the commercial line on making more and more?

There may, though, be a glimmer of hope that the percentage of unsold and destroyed garments might reduce even as production increases, thanks to recent policy developments such as France's Anti-Waste Law for a Circular Economy, introduced in 2020, the EU's ban on the destruction of returned and unsold textiles in 2023, and, more recently, the [Responsible Textile Recovery Act of California](#).



According to Delphine Williot, Policy & Campaigns Manager at Fashion Revolution, policies such as the EU's ban on the destruction of unsold and returned textiles will mean that brands and retailers "will no longer be able to get rid of their unsold goods by simply burning them". Williot adds that these policies "will also hopefully push for better management of textile waste by ensuring that what is [currently] considered waste can find a new life". While a step in the right direction, Williot stresses that is not clear whether this ban will lead to a decrease in overproduction by itself, since punishing the result of a problem is not necessarily the same thing as addressing its root cause. Or as Williot puts it, "the industry needs to address its overproduction problem head on, by producing less and wasting less".

Williot also points out the critical role of the Waste Framework Directive in addressing fashion's overproduction issues, as it includes an Extended Producer Responsibility (EPR) scheme that goes beyond waste management. This ensures that "brands are held financially accountable for the impact of overproduction", by paying fees "based on the quantity of products put on the market and [putting] a financial value on the potential waste they are adding to the planet". As compelling as this legislation feels, though, Williot notes that there are still gaps to address overproduction which include lack of "concrete commitments on the setting of textile waste management and reduction targets" and "provisions to allow the transfer of EPR fees to support regions heavily impacted by used textile exports from the EU among other areas".

TECHNOLOGY: THE NEXT PIECE OF THE PUZZLE

Overproduction consists of multiple elements: the large number of products that are produced and sold but seldom or never worn, those that are sold but later returned, overstocks that are shifted to discount racks or outlets, and obsolete products that remain unsold. The latter is primarily due to a major mismatch between supply and demand (even with planned markdowns taken into account), with forecasting done manually, at fixed intervals - ideally backed by objective data - versus an extremely dynamic market. If fashion is going to reduce and eventually eliminate unsold inventory - absent any large-scale move to on-demand production - improving the accuracy of demand forecasting is going to be crucial, which is where AI-driven forecasting could prove valuable.

Consumers' fast-evolving interests are influenced by various sources such as brands, social media, friends, and community networks, according to Ganesh Subramanian, founder of Stylumia - a company that leverages a vast influx of market data and uses AI to surface insights from it, with the goal of providing more timely guidance and customised, geography-specific trend forecasts to brands and retailers.

In addition to effectively forecasting trends and consumer interests, AI-driven forecasting could also help brands produce more accurate sizing ranges by understanding consumers' preferences for size and fit.

Subramanian highlighted, though, that effective AI models depend on high-quality data; hence, they "gather detailed data at the size, fit, and SKU levels, encompassing all visual and non-visual attributes, which allows us to forecast fit and size trends by geography and category". By integrating this information with a brand's own data, AI could provide comprehensive insights, which would enable companies to, as Subramanian puts it, "adjust their product fits based on these insights, leading to enhanced sales relevance, increased sales, and fewer returns".

And while more sales is not a good thing, environmentally speaking, in isolation, the words "relevance" and "returns" have a major bearing on the outcome of those sales. If more products reach the market but are actually the products the market wants, and are sold at full price, not returned, and then go on to have a lasting lifespan in the circular economy, this could still be a net positive outcome despite, on the surface, being a symptom of more growth.



Using AI tools for accurate demand forecasting, then, might not only help reduce overstocks and the environmental harm caused by them, but could also benefit brands financially by saving them unnecessary costs from producing, transporting, storing, and eventually destroying unsold products. Moreover, it prevents excess stock from being sold at a discount, which is one of the most significant expenses for fashion brands and retailers. Preventing this is particularly important for luxury fashion brands to maintain their brand value. Subramanian also mentioned that through case studies, they have noted improvements “in absolute full-price sell-through rates by 5-10%, translating into an absolute 2.5% to 5% increase in profit margins which represents a 15-33% surge in profitability”.

A key question remains, though: is producing to demand the final objective? Or does the key to making the biggest difference lie in changing the shape and scope of that demand in the first place?

THE POWER OF CONSUMERS

Consumers are arguably one of the most important contributors to fashion's cycle of overproduction. As the old saying goes: if people keep buying something, or at least expressing a signal that they might buy it, someone is going to keep making it.

Even if brands start producing to sensed demand rather than predicted demand, if those demands are excessively high, the problem still remains. Today, consumers' demand is more heavily fuelled by social media than by traditional advertising. TikTok in particular, where trends have an alarmingly short lifespan, has become a key cog in fashion's economic engine. As a result of this fleeting redefinition of “trend,” by the time an online order arrives, it might already be out of style, prompting consumers to place an order for the next trendy item having never - or very sparingly - worn the original. For the brand, though, this represents “success,” since each item sold to a consumer and not returned is validation that demand existed for that product.

However, again, there is a glimmer of hope here, with a shift seemingly happening in consumers' attitudes towards mindful consumption. In the past few years, we have seen the rise of various movements, from ‘anti-hauls’ in the early 2010s, to ‘deinfluencing’ in 2023 and ‘underconsumption core’ in 2024. One could argue that they are just like any other trend on social media with a short lifespan, but they all essentially have the same core message: conscious consumption.

While there is undoubtedly a long way to go until these trends become more widespread and we see a real shift in consumer demand globally, it is key to remember that while shifts in trends happen quickly, changes in consumer culture take time. After all, we did not get here - to the place where fashion is both over-wanted and over-made - overnight, so, it is rather unrealistic to expect a quick resolution or a sudden reversal.

But what does a potentially lower demand for products mean for fashion brands in terms of profitability? How far can growth be scaled back before it becomes inimical to business?

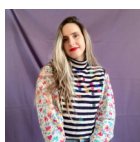
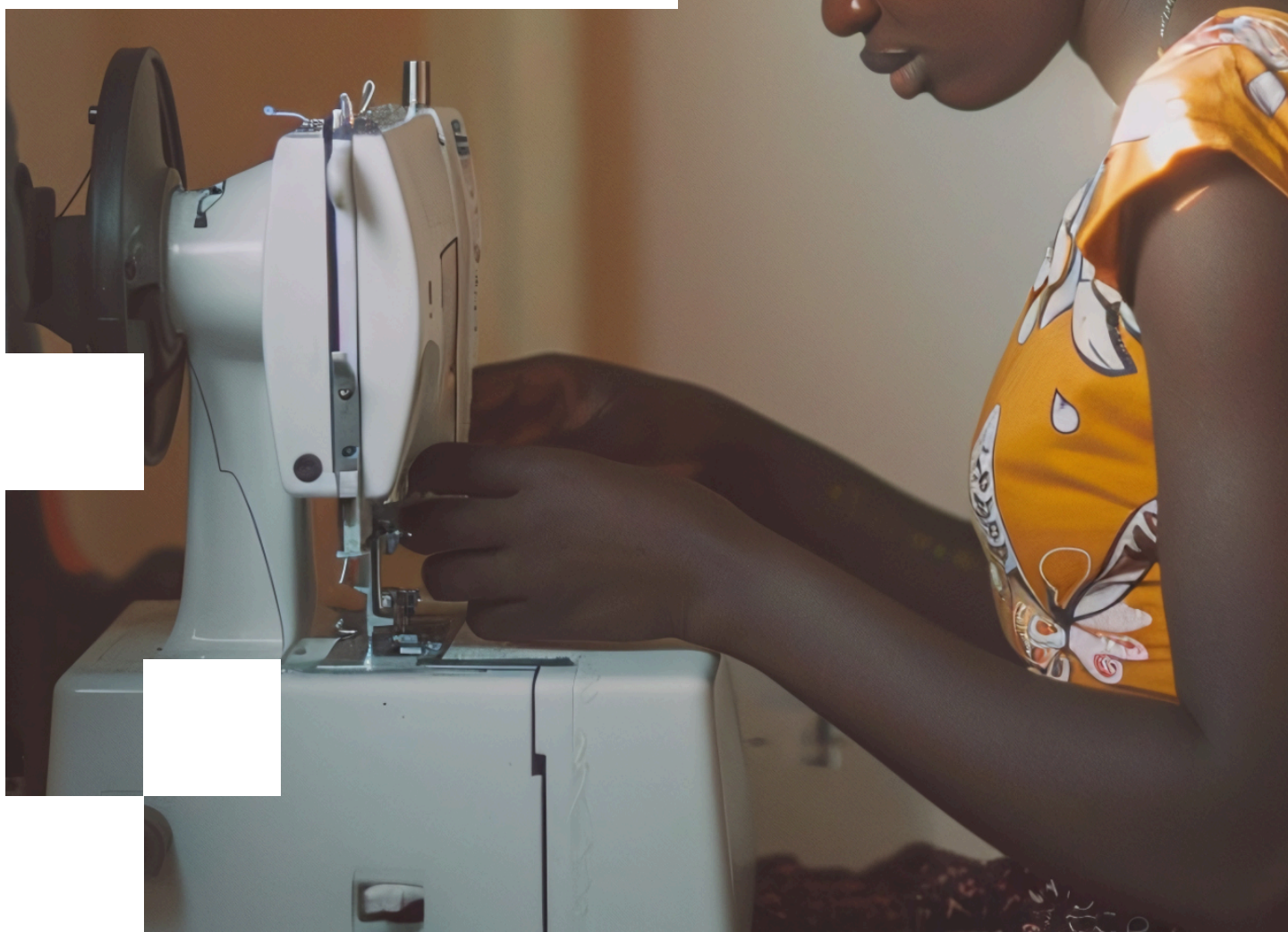
As William Green of modular menswear brand LESTRANGE [wrote in last year's Sustainability Report](#), it means brands and retailers have to find innovative ways to work with consumers and regulators to figure out new business models. In the nearer-term it might also look like brands working to [decouple their growth from production](#) by moving away from being heavily product-focused and diversifying their offering in the form of services and experiences. These offerings will not only serve as additional revenue streams for brands, but also enable them to connect with their customers in ways not possible through products alone, and in turn to better understand the shape and scope of demand.

While many fashion brands have started incorporating service and experience centred offerings, more is certainly needed to strike a balance between profitability and sustainability. This, coupled with new policy developments and technological advancements that enable accurate demand forecasting, can certainly contribute significantly to tackling fashion's overproduction problem, but of course, as mentioned at the start, there are many more pieces of the puzzle that must fit together if fashion is to right-size its production to fit both the needs of people and the demands of the planet.



WHO RISKS FALLING THROUGH THE GAPS IN A CIRCULAR FASHION SYSTEM?

WITH THE LINEAR FASHION MODEL SO DEEPLY ENTRENCHED, CHANGE IS PROVING DIFFICULT FOR BRANDS. BUT WHAT ABOUT THE LABOUR MARKET? IS IT POSSIBLE TO PROMOTE CIRCULARITY WITHOUT LEAVING SKILLED PEOPLE BEHIND?



By Sophie Benson
Author
& Freelance Journalist

Sophie is a freelance journalist working with a focus on sustainable fashion, the environment, workers' rights, and consumerism. She serves as the sustainability columnist at Dazed and also writes for publications including Vogue, The Guardian, Atmos, The Independent, Raconteur, Vogue Business, and AnOther. She covers a host of topics including legislation and policy, greenwashing, circularity, labour, consumer behaviour, and fashion innovation.

Half a world away from the big four fashion capitals where, at the time of writing, thousands of looks are being sent down runways to showcase what's new for SS25 before AW24 has even really begun, 30,000 people in Ghana's capital are reselling, repairing and upcycling around [25 million garments](#) per month. Working within Kantamanto Market, the largest secondhand market in West Africa where approximately 15 million items of used clothing arrive every week, skilled tailors bring to life a circular fashion system on a scale that feels like a far-flung dream in the Global North.

On the surface, the fashion industry in the US and Western Europe appears to be embracing circularity from all angles. [eBay](#) and [Oxfam](#) recently hosted catwalks showcasing secondhand outfits at London Fashion Week, luxury upcycled brand [Hodakova](#) bagged the 2024 LVMH Prize, and a slew of brands, from [M&S](#) to [Cos](#), has clamoured to join the ranks of those offering repairs services. But the production of brand-new garments made from virgin resources rattles on at warp speed. Not just production but overproduction, to the tune of [15-45 billion garments every year](#), as one report estimates.

Though the circular economy has reached “megatrend” status, according to the [2024 Circularity Gap Report](#), with the volume of discussions, debates and articles on the concept nearly tripling within the last five years, global circularity has in fact dropped by 21% in the same timeframe.

Accurate trend and demand forecasting can go some way to addressing the overproduction problem but to promote truly circular system change over merely tweaking the linear model [The Or Foundation](#) (an organisation that works out of Kantamanto) suggests “reduction targets for new clothing of at least 40% over five years, balanced with the increase of reuse and re-manufacture of existing materials”. Kantamanto has finessed the latter, and it's a very different process to the precise, productionised, linear fashion manufacturing machine, requiring garment-by-garment inspection and ‘diagnosis’, experimentation, improvisation, and adaptability. An increase in reuse and manufacturing of this type in line with a production decrease of 40% - or even half that - would require an enormous shift in the labour market and reskilling on a grand scale.

PUTTING WORKERS AT THE HEART OF THE CIRCULAR TRANSITION

“The signals we're getting from global brands and retailers is that they're looking to change, to move towards a circular economy. Now, what does that mean for workers? That's a different question,” says Christina Hajagos-Clausen, Textile and Garment Industry Director at [IndustriALL Global Union](#).

The slow burn of circularity within fashion – still lingering in pilots and fringe projects in many cases rather than being folded into core business models – means that currently it hasn't changed any production patterns or led to loss of jobs, according to Hajagos-Clausen. Rather all eyes are on where jobs might migrate, where recycling centres will be located, and where in the production line innovation will happen.

Legislative moves such as the EU's Ecodesign for Sustainable Products Regulation and textile-based extended producer responsibility (EPR) under the revised Waste Framework Directive appear set to propel a demand for circular skills to meet mandates around repair and recycling, but they raise the question of how we reshape the industry according to the circular economy without leaving workers currently embedded in the linear system behind.

“A WHOLESALE SHIFT STILL AWAITS, BUT CHANGE IS ALREADY HAPPENING IN SMALL POCKETS.”



In a [position paper](#) on the EU Textiles Strategy (which fed into new and existing regulations), IndustriALL Europe called for “special attention to be paid to the potential impact on the current European workforce of the transition” and insisted that “trade unions play a key role in order to ensure that current jobs are safeguarded, while also working on creating more quality jobs” in the circular economy.

The Tamil Nadu Textile and Common Union (TTCU) holds a similar position. “Any discussion on a just transition to a greener economy must take place not on capital’s terms, but on labour’s,” the union stated in a report by [War on Want](#).

However, the unknowns make it difficult to anticipate precisely where the risks lie, which is why, as Hajagos-Clausen asserts, organising on a sector-wide level now is essential. Enterprise-based bargaining, so often the norm in the garment industry, is not only inefficient but makes it near-impossible to put systemic protections in place for a future that will all but require systemic change.

FIRST MOVERS

A wholesale shift still awaits, but change is already happening in small pockets. To staff its factories in Amsterdam and London, [United Repair Centre](#) (URC) - a B2B clothing repair service which provides training and job opportunities for people who struggle to access the labour market - scouts local unemployment databases for those with textile experience or even simply “textile ambition”, as CEO Thami Schweichler puts it. “The more repairs you can bring in, the more jobs I can create. And that’s really the cornerstone of the company,” he says.

To bolster its factory-based scouting, training, and support into work, URC launched the more formal [United Repair Academy](#) in January 2024. Operating in collaboration with MBO College, ROC Amsterdam, and the Amsterdam-West Municipal District, the Academy takes students through modules including basic knowledge of materials, skills in measurement and cutting,

pattern drawing, sewing techniques, and basic and complex repairs. Alongside these hard skills, students obtain soft skills such as language, participation, and how to operate in a dynamic work environment, says Schweichler. “[Students] have a lot of self-empowerment to be developed, so we really focus on that to create a sense of community where they can thrive,” he continues.

Lindsay Rose Medoff, CEO and co-founder of [Suay](#), a vertically integrated reuse and remanufacturing sewing shop in LA, has similar intentions but a slightly different approach, seeking to upskill experienced garment workers in remaking to diversify and future-proof their skill set. “Suay’s challenge has been not scaring off workers when they first come here and they see the piles of clothes,” she says. “As a baseline we have to provide a space for workers to feel safe enough to explore a different way of working.”

Like URC, Suay has been training its workers onsite, but is set to launch the Suay Centre for Reuse and Repair in the near future. The neighbouring facility will have an established curriculum (which Medoff believes should be open source), where garment workers can be upskilled not just as a route into a job at Suay but to demand higher salaries, develop their career, or start their own business. “It’s a training program to be able to give garment workers not only the skills for the planet and for consumers, but also to create generational wealth,” says Medoff.

The creation of fairly compensated, rewarding work which allows workers to thrive as a result of their much-needed skill is as much a central tenet of a worker-centred transition to circularity as the security of reskilling. “A transition to a more just and sustainable world is not possible by pushing more austerity on workers,” says the TTCU. “It is only possible through the payment of living wages for supply chain workers. It is only then a fundamental redistribution of wealth happens and without it, a just transition is not possible.”



“THE SLOW BURN OF CIRCULARITY WITHIN FASHION – STILL LINGERING IN PILOTS AND FRINGE PROJECTS IN MANY CASES RATHER THAN BEING FOLDED INTO CORE BUSINESS MODELS – MEANS THAT CURRENTLY IT HASN’T CHANGED ANY PRODUCTION PATTERNS OR LED TO LOSS OF JOBS.”



"THE NUANCED SKILLS AND INTUITION FOR HANDLING FABRIC THAT GARMENT WORKERS HAVE IS A VALUABLE FOUNDATION FOR LEARNING CIRCULAR TECHNIQUES."

SKILL TRANSFER

Medoff says the nuanced skills and intuition for handling fabric that garment workers have is a valuable foundation for learning circular techniques. For instance, an experienced sewer will be a dab hand at making two differently weighted fabrics behave when turning them into one new piece. Often, the skill hurdles are more creativity- and confidence-based. What's a "cool" mark, patch or fade to make a feature out of and what should be discarded? Which patterns clash well, and which just plain clash? Should a tear be stitched or patched? "It requires thinking and the critical judgement ability of the tailors," says Schweichler.

For Anita Shannon, founder of newly launched UK upcycling platform [Newless](#), that creativity and critical judgement comes built-in with the fashion graduates who responded in droves to her job ads. "It's hands on, they're not just cutting the same pattern every day. They're making diverse clothes, and they're working with customers," she says. "At the core, our tailors need to have creative inspiration. It's a lot of freedom."

Though beholden to unit targets and mostly assigned to very specific and repetitive tasks such as sewing the same pocket on the same style of shirt, the technical skill that garment workers possess is inherently transferrable. It's not an overhaul in technique that's required, rather an injection of fashion school-style design thinking and getting comfortable with a new way of working that offers more agency than other settings.

A DEMOCRATIC APPROACH

The wave of repair and remaking services such as URC, Suay, and Newless are necessarily being established in Western consumer markets to tackle the glut of product and keep it in circulation locally rather than allowing it to cross borders become another nation's problem. However, the heavy-handed dictation of Western expectations across many Asian and African countries has seen the production line push out artisanal making and secondhand exports crowd out local textile industries, so the models springing up across the UK and the US needn't be definitive.

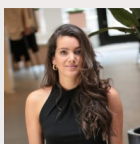
Across the globe, techniques for extending the life of textiles, such as Kantha and Boro, have existed for centuries, and circular manufacturing education programmes such as Ghana's [No More Fast Fashion Lab](#), and [Ethical Fashion Initiative's](#) three-year project in Kenya, "Designing the Future, a Green and Inclusive Fashion Ecosystem", are focused on job production in a local context. A thriving circular economy should create space for repair and remanufacture of many different types, with regional knowledge and techniques properly valued. Not only would this diversify what circularity looks like for fashion, it would reject the dominant Westernised systems and perspectives which have led to the exportation of the disadvantages and failures of the linear system and the hoarding of the rewards.

The scale of the reskilling and business model shifts needed to catalyse a circular fashion economy may seem abstract or improbable. But so too did today's globalised ready made garment industry just a few decades ago, and avoiding the issue is only [delaying climate progress](#) across multiple sectors.

"I think that many people are looking to see if we can actually pull it off. And we're going to keep trying to create this," says Medoff. "It doesn't have to be so idealistic. I believe in these alternative solutions."

TECH TALENT: THE MISSING PART OF FASHION'S RACE TO NET ZERO

DOES FASHION HAVE THE TECHNOLOGY AND SCIENTIFIC TALENT IT'S GOING TO NEED TO TURN TECH CAPABILITIES INTO MEASURABLE ACTION?



By Sanne Schoenmaker

Co-Founder

TECH TAILORS

Sanne Schoenmaker is the co-founder of Tech Tailors - a fashion tech company dedicated to eliminating waste and perfecting fit in the fashion industry with cutting edge technology.



Fashion, for outsiders, is known for its glamorous marketing campaigns and increasingly, for its sub par upstream working conditions and sustainability challenges - not necessarily for its technical job opportunities. For anyone looking to forge a career in technology, the Silicon Valley Big Tech sector would be the more obvious choice.

But, in order to meet net-zero goals, fashion is in desperate need of new technical talent, and lots of it. Upending a trillion dollar supply chain is no small undertaking, and modelling and mitigating environmental and social impact will require the brightest minds to capitalise on a broad spectrum of opportunities (from the fundamentals of systems and data science to the frontiers of AI) to redesign the fashion value chain.

So there's a big gap to bridge if the industry is going to accomplish its aims - and it's a gap that will be difficult, if not impossible, to bridge if fashion does not make itself into a more attractive sector for the most sought-after talent. Today, the majority of technically skilled college graduates (physics, mathematics, computer science, chemistry) find jobs in consulting, finance, big tech or academia. Not fashion.

To put the figures into context: it is estimated that less than 1% of maths graduates go on to work in the fashion industry, despite a significant demand for those skills. Please note that indirectly, this number is higher, since the graduates ending up in tech and consulting do work for the fashion industry indirectly.

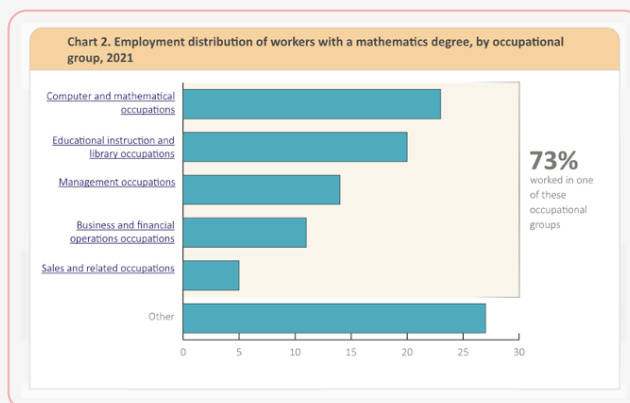


Figure 1: employment distribution of workers with a mathematics degree, by occupation¹

Overall, then, fashion is lacking tech talent. This is not the same as saying there aren't brilliant tech people working in fashion right now - but from a whole-industry perspective, there are not nearly enough of them.

While fashion investments in tech talent have been lagging behind, fashion has been investing in technology as a whole: based on 2021 data, \$16.2 billion was invested in downstream-oriented tech by fashion according to The Business of Fashion and McKinsey. Around 55% of these investments went towards ecommerce technology, while the rest was mostly put into payments technology, buy-now-pay-later tech and social commerce².

But IT spending is still a fraction of consumer-facing and marketing spend in the fashion industry.

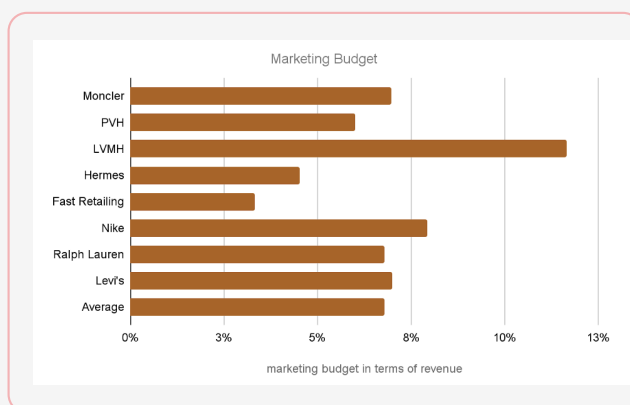


Figure 2: marketing budget in terms of revenue

**Marketing budget in this case often refers to ads expenditure, although it is not singularly defined so in (annual) reports. LVMH ad expenditures, for example, are estimated around 10.5 billion euros. As per their own annual report, marketing and selling expenditures are 36% of revenue.*

On average, big fashion houses allocate around 7% of their revenue to IT expenditures. LVHM allocates a royal 12% of revenue to marketing, while they allocate a mere 1.4% to IT³. In 2021, fashion brands, on average, allocated between 1.6% and 1.8% of their revenues in technology. By 2030, that figure is expected to rise to between 3.0 and 3.5 percent⁴.

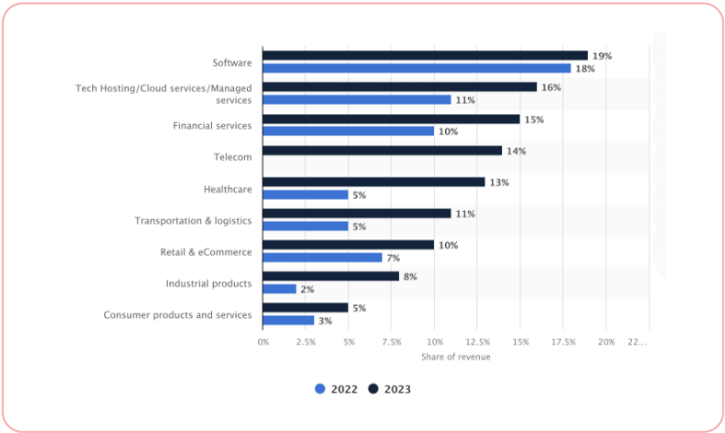


Figure 3: Statista IT spending as share of company revenue in 2022 and 2023, by industry⁵

An average IT revenue share of 1.7% puts fashion behind IT spending in other industries. Little data is available on IT revenue share for manufacturers, this quite possibly could be higher than 1.7%, since production hardware and process and efficiency overhauls tend to be more costly than pure software initiatives.

To help solve the sustainability crisis in fashion, IT spending as a percentage of revenue perhaps should be closer to 10%, given how tightly linked the capture and usage of upstream data are to the industry’s need to understand and control its impact.

According to the latest industry report by Market.us, generative AI spending will display a CAGR of 37% in the next nine years⁶, suggesting that fashion will indeed significantly amp up its technology investments.



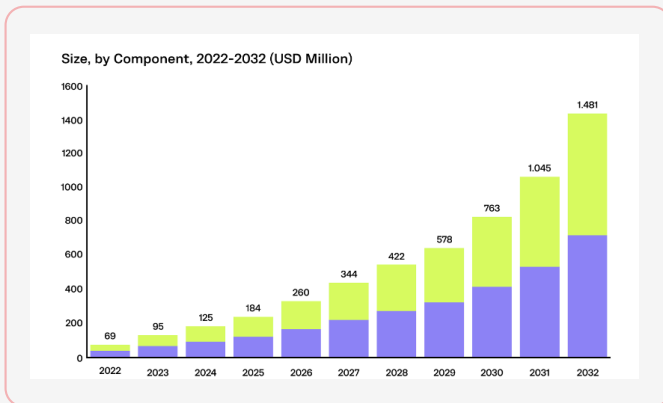


Figure 4: Global Generative AI in Fashion Market By Component⁷

But who and what to invest in? The recent developments in AI have drastically changed the technical labour landscape. A good deal of programming can now be done by one architect, instead of two junior developers. Just a technical degree is not sufficient. What kind of skillset and experience is required to effectively find and implement innovation in the supply chain? Which minds can capitalise on the automation opportunities AI offers? Fashion needs more (tech) people who can enforce systemic change, rather than just efficiency gains.

And this is not just a hiring spree for acquiring new talent, fashion can also upskill its current staff to take advantage of these possibilities.

What are the best use cases for new tech? What's the financial impact? What should these new hires focus on? There's the popular, outwardly-visible side of fashion tech - the metaverse, e-com tech, virtual try-ons, AI filters. And then there's the not so popular side of fashion tech: the supply chain. It just doesn't have the same ring to it. But it's where the biggest decarbonisation and transformation opportunities lie.

In order to meet net-zero goals, the fashion industry has to simultaneously tackle more sustainable material production, implement renewable energy in factories, ensure lower overproduction volumes, more sustainable transport, better EOL practices, and more efficient recycling practices to name a few. These issues won't be solved overnight, but in order to solve them we need the best and brightest - many of them.

More budget allocation towards (people in) IT only solves part of the problem. How do we convince these graduates to work for the fashion industry, not Big Tech? Fashion, from a financial standpoint, is not the most attractive industry to work for technically skilled people.

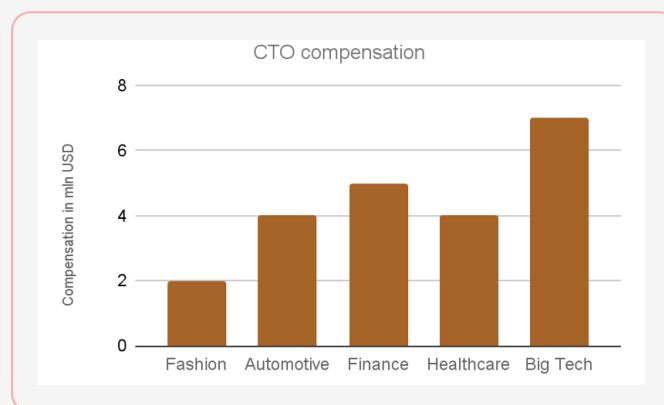


Figure 5: CTO salaries across industries

**please note these are very rough numbers, remuneration consists of different aspects (salary, bonus, stocks etc.), these figures represent compensation in big corporations. Based on Equilar, Salary, Cowen Partners, Motion Recruitment, Comparably data.*

CTO salaries (not unsurprisingly) are highest in big tech companies. But they're also higher in automotive, healthcare, and finance.

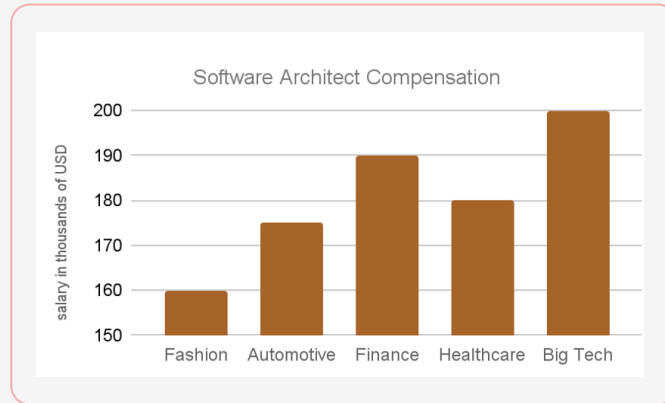


Figure 6: Software engineering salaries across industries

A software architect (again not surprisingly) stands to make the most in big tech. Like CTO's, software architects are paid substantially more in other industries.

So maybe the IT budget shouldn't be allocated to merely hiring more technical people, but also to paying (existing) technical people in these companies a more competitive salary.

Now, remuneration isn't the full picture. It's quite possible that technical graduates aren't aware of the positive (environmental) impact they could have while working in the fashion industry. While estimates vary, the fashion industry is responsible for 2%⁸-10%⁹ of global GHG emissions - there's a lot of progress to be made. For an industry that's selling and transporting roughly 184 billion garments per year¹⁰, an incremental improvement in one area could have a substantial effect on the whole industry, and in turn, the whole world.

Phenomenal technical progress has been made in the past few years in the fashion industry, but we need more phenomenal progress, in more areas of fashion - especially those areas where the industry is facing external regulation and disclosure requirements.

Fashion can no longer afford to focus the majority of its budget on the beautiful side of fashion - marketing, we need to shift the (financial and HR) focus to the ugly side: the supply chain, if we want a fighting chance of meeting net zero goals while maintaining profitability.

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1. <https://www.bls.gov/ooh/field-of-degree/mathematics/mathematics-field-of-degree.htm>
 2. <https://www.businessoffashion.com/articles/technology/state-of-fashion-technology-report-investment-capital-funding/>
 3. <https://www.globaldata.com/store/report/moet-hennessy-louis-vuitton-se-enterprise-tech-analysis/>
 4. <https://www.mckinsey.com/industries/retail/our-insights/state-of-fashion-technology-report-2022>
 5. <https://www.statista.com/statistics/1105798/it-spending-share-revenue-by-industry/>
 6. <https://market.us/report/generative-ai-in-fashion-market/>
 7. <https://computools.com/fashion-technology-trends/>
 8. <https://apparelimpact.org/resources/roadmap-to-net-zero-report-2021/>
 9. <https://www.europarl.europa.eu/topics/en/article/20201208STO93327/the-impact-of-textile-production-and-waste-on-the-environment-infographics>
 10. <https://www.statista.com/outlook/cmo/apparel/worldwide#volume>



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MEET THE KEY PLAYERS

With the global regulatory environment tightening, consumer scrutiny of both environmental and ethical claims at a peak, and a looming gulf of supply and demand where preferred materials are concerned, fashion is in a precarious position. To support the industry in making the urgent transition to more transparent and sustainable ways of working, technology providers across different categories are building solutions designed to provide visibility, accountability, and actionable insights. This section of The Sustainability Report 2024 profiles some of the most important.

Just as there is no single definition of sustainability, and no universal strategy to reach it, there is no such thing as a turnkey, all-encompassing sustainability solution. Instead, the future of fashion's urgent efforts to improve its environmental and ethical credentials will be defined by different digital platforms, direct process interventions, scientific innovations, and a wide suite of different software components that, over time, will continue to combine to create an end-to-end ecosystem.

As you'll notice when you read through this section of the report, we are already beginning to see that ecosystem take shape. From governance frameworks and data modelling methodologies, to connected manufacturing hardware, circular infrastructure, and AI-assisted risk surfacing, the fashion technology community has started to come together to build a clearer, more collaborative path.

As we wrote in last year's introduction, "the path to progress in sustainability will require a comprehensive approach where stakeholders strategically integrate multiple interconnected systems". This remains as true in 2024 as it was in 2023, and while it's encouraging to see those integrations being developed (or at the very least publicly committed to) by the tech community, arguably even more tangible progress will come from brands and their partners recognising that a multi-pronged, multi-platform, multi-party approach is the only way to achieve the industry's strategic objectives. Genuine sustainability will not be reached by any one company alone.

To aid in finding the next missing piece of that ecosystem, this section of the report features a group of key technology vendors (who have also sponsored this report and allowed us to keep it free-to-read) who have demonstrated capabilities that we believe will contribute to that holistic vision for

sustainability. Each of them has been asked direct (sometimes difficult) questions designed to allow brands like yours to discover, shortlist, and work with new partners whose visions, ambitions, and practical solutions could be a positive fit for your growing sustainability solutions.

Each vendor contained in this section has provided key qualitative and quantitative information, including:

- **An overview of their solution**
- **A list of their headline customers**
- **An indication of their monthly active users**
- **A breakdown of their pricing model**
- **A laundry list of their technology partnerships and integrations**

For each vendor, we have also interviewed a senior executive, who we have quizzed on what the near-term future holds for sustainability, where readers should be prioritising their investments, and where they see the industry changing the fastest and most comprehensively.

As always, each vendor has also provided a point of contact, so if you see a solution or service that you believe will be a good fit for your sustainability strategy, simply click the link for more information.

Please note that the information contained in the vendor profiles that follow this page remains the property of the vendors themselves. While we endeavour to check the data we are given, The Interline does not verify the authenticity of customer engagements, user figures, or technology partnerships, and the contents of any advertisements provided to us are solely created by the advertiser.

To find out more about a particular vendor or service provider, jump straight to their profile and executive interview using the links below.

[HYLAND](#)

[LECTRA](#)

[ORITAIN](#)

[PTC](#)

[TRADEBEYOND](#)





Hyland™

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FOUNDED: 1991

Hyland provides intelligent content solutions that empower our customers to transform the way they work and deliver exceptional experiences to those they serve. Our solutions capture, process and manage high volumes of diverse content to improve, accelerate and automate operational decisions and workflows.

With the Nuxeo platform, Hyland helps fashion brands and retailers address three (3) main aspects of sustainability: awareness, materials, and processes.

Awareness – There are two aspects of awareness to call attention to here. The first is related to consumer awareness and ensuring consumers understand a brand's sustainable practices. The Nuxeo platform allows brands to create sustainable campaigns and promote the sustainable practices that an organization employs.

Second is Materials. Through the adoption of Digital Product Creation, the Nuxeo platform helps brands reduce physical samples and prototype creation and distribution cycles

The third is Processes. The Nuxeo platform can support an organization's shift to more digital enabled manufacturing practices while providing the data collection and audit trails for disclosing how their products are made, where their materials are sourced and where manufacturing occurs and what policies drive their workstreams.

Headline Customers

HANES BRANDS INC.

LULULEMON

MAD ENGINE GLOBAL

NIKE

PVH

VF CORPORATION

PRICING MODEL:

The Nuxeo platform has a capacity-based licensing model. In terms of core consumers: we target brands, retailers, and suppliers that all collaborate or play an active role in the end-to-end supply chain.



WWW.HYLAND.COM

FOUNDED: 1991

MONTHLY
ACTIVE
USERS

NORTH AMERICA
60 %

LATAM
< 5 %

EMEA
30 %

APAC
< 5 %

10

TECHNOLOGY
PARTNERSHIPS
INCLUDING:

CLOUD VENDORS:
AWS SUITE
GOOGLE CLOUD PLATFORM
MICROSOFT AZURE

BROWZWEAR
CLO
VNTANA
VARIOUS PLM, PIM, & MDM
VENDORS

What role do you see yourselves playing in both the short and longer term future of sustainability and supply chain transparency in fashion?

Hyland's primary role in the omni-channel supply chain is to provide the digitization and process automation services to assist brands in evolving into more sustainable and transparent practices. It all starts with providing an abstraction backbone to collect the relevant information from disparate sources and make that service available to various federated endpoints for speed, flexibility and leverage.

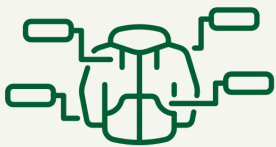
By providing more informed and intelligent processes, the right products can be delivered with less production waste, a higher sell through rate resulting in less disposal waste. Products can be produced using safer, higher quality, more durable materials.

Market value and consumer confidence in the long term is going to be equally balanced between a brand's adoption of eco-conscious choices and their ability to tell their responsible, eco-friendly operations story. Hyland will continue to play a pivotal role in assisting brands with both endeavours by representing critical insights to internal and external stakeholders. The vision is to assist brands in designing for longevity and reusability, create resource efficiencies and connect the data sources to promote circularity from inception to market.

Contact



Transform your enterprise digital content supply chain



Accelerate concept to consumer

Make content actionable



Automate your go-to-market

Ensure data-driven decisions



Drive awareness

Provide disclosure, transparency and auditability

Explore Hyland's Nuxeo Platform for DAM →



In conversation with

**CHAD
MALLEY**

*Global Director
- Digital Asset Management
Practice*

HYLAND

Last year, it became clear that “sustainability” was still a useful term for capturing a very complex set of variables and conditions. This year, we want to look at how those different elements are being arranged and prioritised. Upstream visibility and traceability, for instance, is a separate piece of the sustainability puzzle from textile-to-textile recycling, or material science, or the circular economy. With all these different parts vying for brands’ and suppliers’ attention, and legislation adding time and compliance pressure to the mix, how do you believe our readers should be thinking about prioritisation?

We think brands should be prioritizing their sustainability initiatives based on the health of their business and the maturity of their operations. For instance, a brand that is

fighting for its survival shouldn’t be thinking about upstream visibility or material science, they should be thinking about how digital product creation and more sustainable production practices can positively impact their market effectiveness and operating margins and how introducing circularity can represent extended revenue streams for their companies.

Compliance and industry legislation conformance shouldn’t be the exclusive driver of adoption of these practices. The prioritization should be based on consumer preferences, market share retention and over-all production cost reductions. Focusing on traceability with the intent of quality improvements is more practical than focusing on traceability for disclosure and compliance of statutes that aren’t widely mandated in all geographies and markets yet.

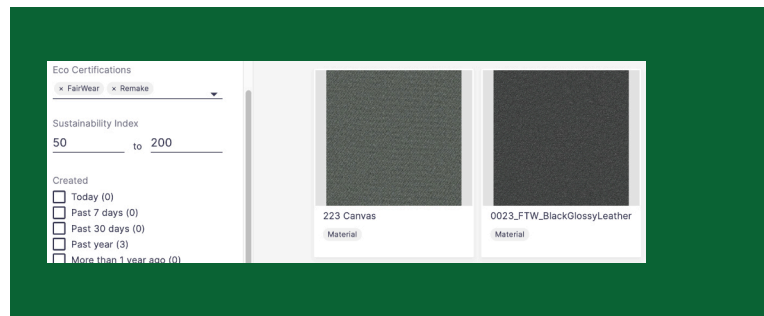


Over the last year, several brands have gone through staff reductions and restructuring. Unfortunately, sustainability departments have been significantly impacted by these market conditions. Attempting to secure budget and long-term investment commitment to multiple pieces of the sustainability puzzle is a fleeting effort. Sustainability directives and operational transformations need to be contemplated and activated in accordance to the strength of your business and the current state of your supply chain. Improvements must directly drive lower costs and increased revenue and not just represent cost centers.

However you stack those priorities, it's clear that reaching sustainability targets is a long-term endeavour, and one that will encompass many - if not all - of the different stages in a typical product lifecycle. Which of those stages do you believe Hyland has a role to play in? And have your brand customers used your platform to get closer to their sustainability targets in any ways that have surprised you?

Hyland's role is typically in the very early stages of the product lifecycle (planning and prototyping before manufacturing) as well as downstream distribution and promotion with traceability and supplier disclosure. As a Digital Asset and Data Management platform provider, we contribute data for decision making and visual reinforcement but we don't play a direct role in the physical manufacturing activities.

We focus on virtualizing product development activities and activating data driven decisions in the end-to-end supply chain. The data and content can be harvested for process improvement, audit and governance as well as attestation.



Our customers continue to iterate and expand the role of their Nuxeo implementations in ways that inspire us vs. surprise us. A unique aspect of addressing sustainability targets that was mentioned recently is the holistic corporate view of being more sustainable and eco-friendly. Identifying conservation efforts beyond the product development supply chain and into the operational aspects of managing the business; measuring the reduction of paper based processes; attempting to reduce energy consumption and compute resources by mitigating redundant tasks and application demands.

When we think about the design, development, and production journey, can you provide some examples of where companies you have worked with are realising the most value, today, from their investments in sustainability? Because Hyland is an interesting case in that these gains will be coming from pure software and process change, rather than any direct mechanical or material innovation.

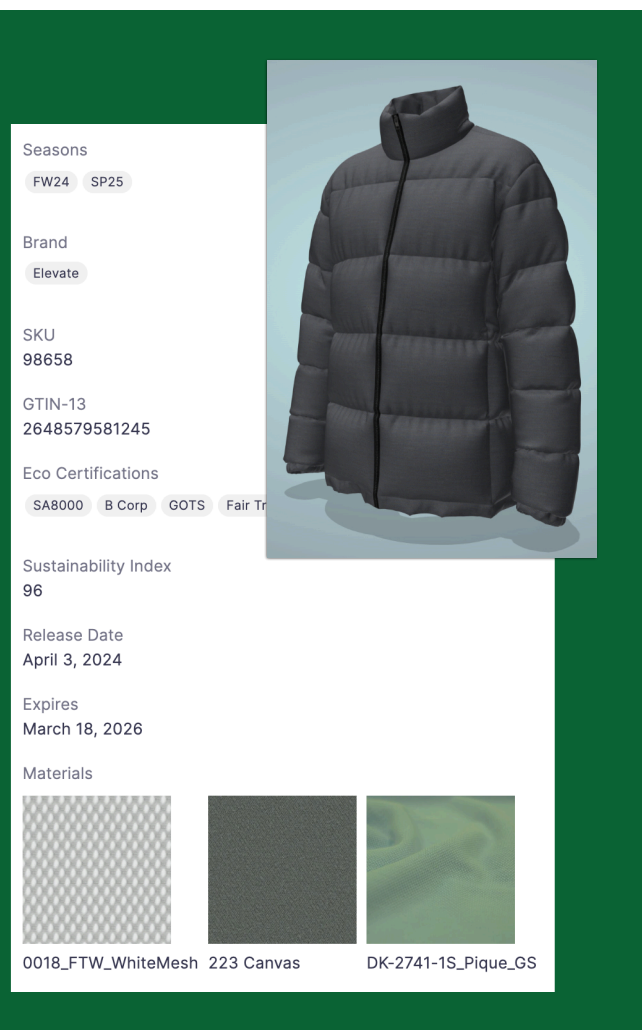
As you pointed out, Hyland's sphere of influence is limited as a software provider. There are three ways in which the brands we work with are realising the most value.

First is related to physical sample creation and waste. By virtualizing material and texture libraries, design decisions can be made more easily without the creation, duplication and multiple versions of physical samples and prototypes. Sample reductions are a good place to start, but one could argue that sample reductions exclusively don't have a dramatic effect on a company's carbon footprint.

Second is with regards to the disclosure and data integrity. By standardizing and centralizing processes, data collection and operating procedures can be documented, audited, and published to ensure sustainable practice claims can be represented honestly and without the risk of litigation penalties and loss of consumer confidence.

Third is with regard to over-all decision accuracy. By enabling data driven decisions and fostering cross-functional collaboration at every stage of the supply chain, end-to-end cycle times can be reduced and more importantly production decisions can be trusted to result in successful outcomes leading to less over-production, inventory surpluses, and maximized linear value chain conditions.

Looking further downstream, what benefits can fashion brands and retailers realise from building greater confidence into how they communicate their sustainability initiatives to consumers? Digital asset management has become a key part of many companies' toolkits when it comes to making sure their products appear in their best possible light, across a broad spectrum of channels, and this increasingly means demonstrating the impact of those products with clarity, accuracy, and accountability.



We often say that brands sell products not digital assets or photo-realistic renderings. Building consumer confidence is more multifaceted than simply capturing a consumer's attention with curated social media campaigns or promotional point of sale displays. Securing loyalty and customer acquisition is more than just communicating a brand's sustainability commitment, but ensuring that communication and commitment is authentic and consistent with the brand's voice.

The benefits are significant:

- Increased customer loyalty
- Positive brand identity
- Increased product margins
- Access to new markets or diversified channels
- Compliance with future industry and environmental regulations
- Improved employee satisfaction & retention

Beyond the internal benchmarks and commitments we've already talked about, the landscape for sustainability is being quickly reshaped by tightening regulations that target different regions and different challenges, and that have different enforcement mechanisms. What do you see happening next in legislation, and how are Hyland's customers preparing for it?

The EU's Digital Product Passport (DPP) is what immediately comes to mind. The DPP will impact most fashion companies in the coming years, particularly those companies that have a significant percentage of their sales in Europe. The DPP is a tool to enforce transparency to share product information across the entire value chain including data on raw material extraction, production and recycling.

Ambitious regulations like the DPP will undoubtedly capture the attention of company officials and serve as industry wide megaphone prelude to more aggressive mandates to follow not just in Europe but across all geographies.

Hyland customers are preparing for these types of legislation by centralizing their data collection efforts. There are no established standards for supplier data so starting a consolidated repository is a natural first step in the disclosure and process improvement evolution.

With sustainability destined to bring sweeping changes to many different parts of the fashion value chain, it seems inevitable that some (or many) current ways of working will have a limited shelf life. Where do you see the industry changing the fastest and most acutely? What do we take for granted today that's unlikely to be viable in the future? And how can fashion businesses get ahead of that shift?

Talent and change management continue to be the longest pole in the tent. Resources that have experience and the skillset necessary to lead these new ways of operating are not only in high-demand, but are also very selective in where they work and live. This puts brands in difficult positions to negotiate wage and cost of living benefits. Outsourcing is an alternative consideration but not a prudent long-term strategy.

Beyond securing and retaining the right personnel, introducing agile processes that dynamically evolve to address constant change requires resolved C-level sponsorship, lean project management, and continuous fulfillment which doesn't naturally map to the traditional fashion industry perspectives that involve restrained budgets and seasonal delivery schedules.

We take for granted the "fail fast" mentality and the culture of experimentation. Those principles are ideal for circumstances where critical milestones are not mandated and performance outcomes aren't so heavily weighted across the health of the business.

Fashion businesses must get ahead of the shift, by focusing on the foundational prerequisites. Unifying the source of truth data silos; standardizing tool sets as much as possible; providing templating form inputs for collaboration and data collection from external partners; and leveraging emerging technologies such as AI and Machine Learning. Don't be distracted by the latest technology trends until the proper foundational capabilities are in place to take advantage of the advanced automations.



LECTRA

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FOUNDED: 1973

As a major player in the fashion, automotive and furniture markets, Lectra contributes to the Industry 4.0 revolution with boldness and passion by providing best-in-class technologies.

The group offers industrial intelligence solutions - software, equipment, data and services - that facilitate the digital transformation of the companies it serves. In doing so, Lectra helps its customers push boundaries and unlock their potential.

Lectra has placed sustainable development and social responsibility at the heart of its corporate strategy. Lectra is committed to sharing these sustainable industrial practices with its customers in the fashion, furniture and automotive industries.

Lectra supports players in the fashion industry by providing high-performance tools capable of guaranteeing supply chain transparency, environmentally friendly production and fair working practices while preserving costs.

Headline Customers

BALLY

MAISON MARGIELA

BALMAIN

PAN-PACIFIC

BESTSELLER

PINKO

JACQUEMUS

SERAFREDDO TAGLIO

M&S

WORKWEAR OUTFITTERS

MAISON MARGIELA

ZUMBA

PRICING MODEL:

All of Lectra's software solutions are offered in SaaS mode. Lectra works with all types of companies in the fashion market, where the group has had a presence for over 50 years. Lectra's customers are mainstream, high-end and luxury consumer brands and companies specialising in manufacturing garments for third parties or their own brands as well as distributors.



WWW.LECTRA.COM

FOUNDED: 1973

MONTHLY
ACTIVE
USERS

Today Lectra has more than **25,000** customers around the world, with over **8,100** Lectra cutting solutions used daily.

Lectra is present in over **ONE HUNDRED** countries and **1/3** of the clothes in wardrobe are designed with Lectra software.

Kubix Link is already used by **300** customer brands and we are the European leader in product data management and collaboration.

Over **100** brands trust TextileGenesis. Currently, more than **10,000** supply chain roles from more than **75** countries are using the platform to enable their supply chains to become more traceable, for more than **1 BILLION** units.

With insights from **5,000** global ecommerce websites, around **5,500** monthly active users in **22** countries gain details thanks to Retviews on products, fabrics, size availability, and international prices, aiding in avoiding overproduction thus reducing the carbon footprint.

TECHNOLOGY PARTNERSHIPS

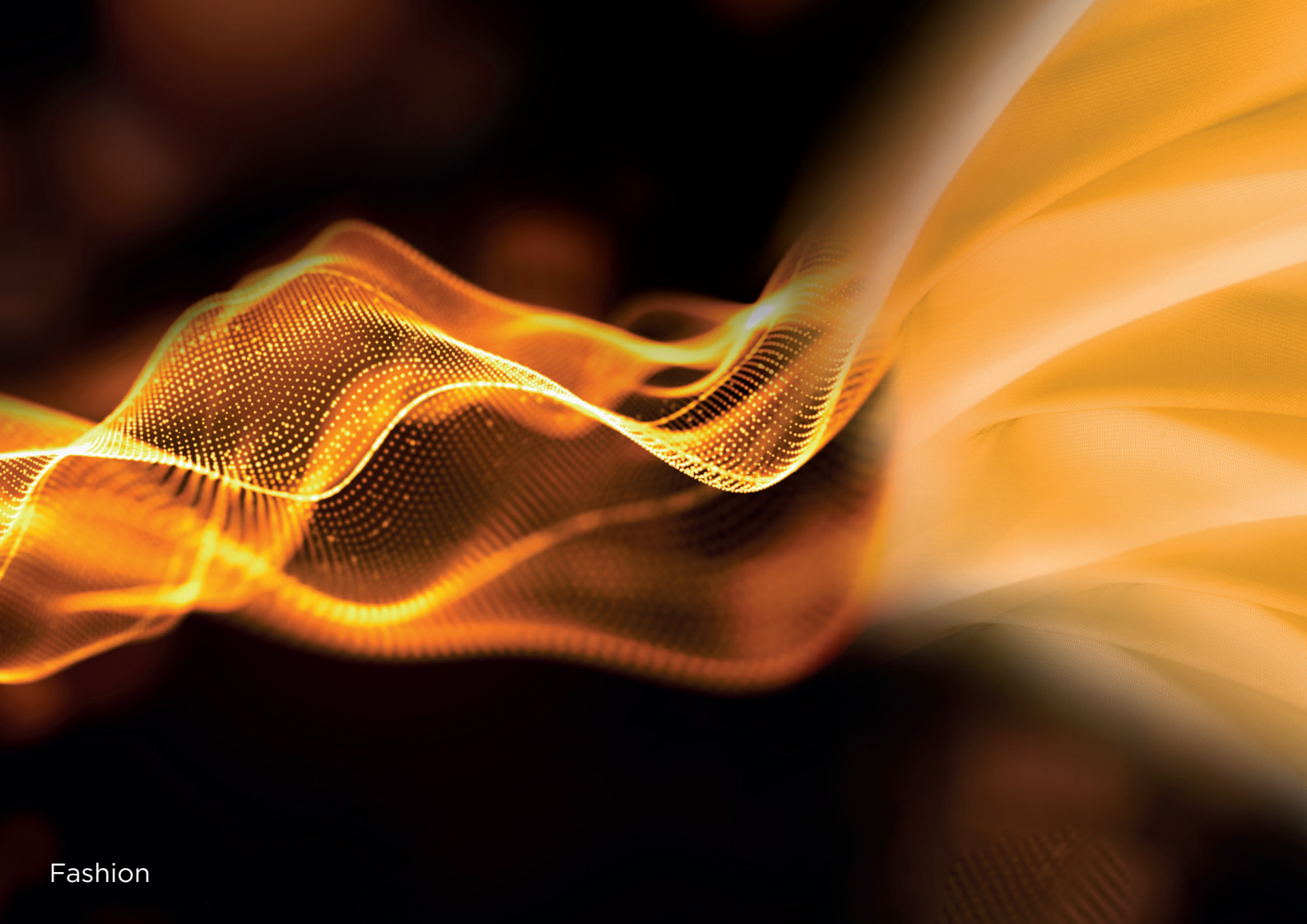
Lectra's latest acquisitions have provided customers access to new technologies: collection collaboration management with **KUBIX LINK (2018)**, fashion benchmarking automation with **RETIEWS (2019)**, marketplace management thanks to **NETEVEN (2021)**, material traceability with **TEXTILEGENESIS (2022)** and more recently **LAUNCHMETRICS (2024)**, a world-renowned technology company to effectively measure brand performance. With these new solutions, customers benefit from technological advances that accelerate their digital transformation and enable them to position themselves as market leaders while being more sustainable.

What role do you see yourselves playing in both the short and longer term future of sustainability and supply chain transparency in fashion?

To become more sustainable, Lectra believes the fashion industry needs the right technology to reduce its material and energy consumption while remaining competitive. As a strategic partner in helping fashion brands transition towards sustainability, Lectra has developed innovative solutions and equipment, and will continue to do so. The Group is committed to systemically applying eco-design and industry 4.0 principles in order to help customers reduce their environmental footprint.

Optimizing fabric consumption is the first step to reducing material waste, and it starts with accurately predicting the quantities of fabric needed during preproduction, followed by adopting on-demand production and a no stock approach. Moreover, to better inform consumers about product authenticity and provenance, Lectra has expanded its software offer to material traceability, with the TextileGenesis pioneering platform.

Contact



Fashion

PUSHING BOUNDARIES

TOGETHER TO UNLOCK YOUR POTENTIAL

Innovation thrives when boldness and technological leadership come together. At Lectra, we lead the way to stand at the forefront of Industry 4.0, helping fashion customers pave a new way forward in a changing industry.

Lectra is uniquely positioned to support fashion players in accelerating their digital transformation, from product development to intelligent cutting, from collection management to marketing, and from e-commerce to traceability.

Our commitment is about shaping a sustainable future where technology fuels aspiration and passion drives excellence.

To learn more, visit lectra.com

LECTRA

We pioneer. You lead.



In conversation with

**MAXIMILIEN
ABADIE**

*Chief Strategy and
Product Officer*

Lectra

Last year, it emerged that “sustainability” was still a useful term for capturing a very complex set of variables and conditions. This year, we want to look at how those different elements are being arranged and prioritized. Upstream visibility and traceability, for instance, is a separate piece of the sustainability puzzle from textile-to-textile recycling, or material science, or the circular economy. With all these different parts vying for brands and suppliers’ attention, and legislation adding time and compliance pressure to the mix, how do you believe our readers should be thinking about prioritization?

Sustainability is no longer just an environmental initiative; it is now a core component of a brand’s economic model and decision-making process. The intersection of economy and ecology, or what we call “Econogy”, is driving businesses to merge corporate social responsibility (CSR) with profitability. Brands no longer need to choose between sustainability and economic growth—both can coexist and fuel each other. Technology plays a pivotal role in achieving this balance, allowing for full visibility and connectivity throughout the supply chain, which enables faster and more informed decisions.

For brands to truly claim sustainability, the first critical step is implementing robust traceability mechanisms. Without transparency and verified data, efforts in areas like textile-to-textile recycling, material science, and circular economy lack a solid foundation. Legislation increasingly demands transparency, and therefore, starting with traceability ensures that brands can meet compliance requirements efficiently. Prioritizing traceability not only fulfills immediate regulatory obligations but also creates long-term benefits by reducing waste and enhancing material reuse.

How has Lectra itself tackled that same question of prioritization? As a company with broad reach across the extended supply chain, up and downstream, you have a unique vantage point on both the importance the wider industry is placing on sustainability, and its current maturity state. So where does sustainability, CSR, and ESG sit in your corporate strategic hierarchy, and what are you seeing industry-wide that has influenced that choice?

Lectra places CSR at the core of its corporate strategy with 5 major areas of action: respecting the highest ethical standards, designing eco-responsible offers, promoting an inclusive, diverse and vibrant work culture, reducing the environmental footprint of our activities, and providing support for the next generation.

Lectra has always supported customers in reducing their environmental footprint. We prioritize material savings with our nesting solutions, Quick and Flex Offer, and Fashion On Demand solution along with applying eco-design principles for each new generation of equipment. For example, the new cutting equipment VectorFashion iX2 and VectorFashion Q2 uses 30% to 40% less energy than the previous versions. To achieve sustainability, Lectra believes a traceable and transparent supply chain is essential, making it a priority for the Group. Hence, TextileGenesis, a Lectra company, offers a market-leading traceability platform that enables brands to track fabric from fiber to retail.

These elements align with industry trends towards transparency and accountability. Our extensive reach across the supply chain allows us to influence and implement sustainable practices effectively. Industry-wide, we see a growing emphasis on transparency, driven by consumer demand and regulatory pressures, which reinforces our focus on integrating sustainability deeply into our operations and solutions.

We pay a lot of attention to software, and the data it relies on, when we talk about sustainability, but comparatively little to where that data comes from and what it means to capture it at source and manage it at scale. Lectra has been a major proponent of Industry 4.0, especially connectivity in the cutting room and throughout the production process, for a long time, so tell us what it means, in 2024, to measure environmental impact directly in the supply chain - and how to integrate that data into the rest of the tech stack in a way that allows brands to manage their footprint and design more responsibly.

In 2024, Industry 4.0 technologies continue to revolutionize the way brands optimize their supply chains, driving both sustainability and productivity. Lectra has been a pioneer in this space, integrating IoT and data at scale since 2007. Our innovative approach, with thousands of connected cutters, enables predictive maintenance and achieves up to 98% uptime, extending the lifespan of our equipment while reducing operational costs.

By embedding IoT sensors and AI-driven analytics across our equipment and software, we help brands optimize production, connecting upstream and downstream processes seamlessly. These insights allow brands to manage operations, supply chains, and resource consumption more efficiently.

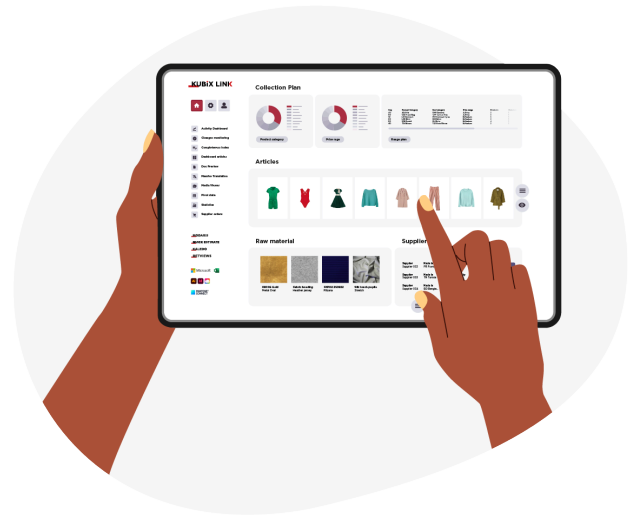
For example, our collaborative Kubix Link PLM solution provides a centralized hub for enhanced collaboration and sustainability. Brands can track their collections with greater traceability of materials, ensuring data compliance with global standards and providing the necessary information to authorities, partners, and consumers. Additionally, for international brands selling in markets like France, direct API connections to French regulatory bodies such as Ecobalyse facilitate compliance with environmental standards like the PEF score, making sustainable practices profitable through material and energy savings.

Looking further upstream, a huge part of any product's impact is determined by materials. But simply choosing the right fabric is not a guarantee of sustainability, because the journey from raw fibre to finished product is long and influenced by so many different actors and stakeholders - all of whom have different priorities and incentives. What does it mean to get alignment across all of them? And what does your experience with TextileGenesis tell you about the mechanics of achieving traceability and provable material provenance?

Achieving alignment across all stakeholders requires robust traceability systems and clear communication channels. TextileGenesis exemplifies this approach by using Fibercoins™ technology, which ensures the authenticity and traceability of sustainable fibers from raw material to finished product. It is disruptive because it engages both ends of the textile value chain and the entire sustainable materials ecosystem (tiers 1-6 and certification partners) - while other traceability systems use a product backward approach offering limited and unreliable traceability (tiers 1-3). TextileGenesis leverages AI for value-chain modeling and integrates with ESG standards, providing real-time transaction tracking and third-party audit support.

Thanks to TextileGenesis, brands have access to industry's largest supplier network, where they gain visibility on the entire ecosystem of their collection production (fiber producers, material certification standards, independent third-party audit bodies). More than 90% of the premier ESG standards and industry organizations have signed a strategic partnership to board the platform.

TextileGenesis shows that such technology fosters trust and accountability, ensuring all stakeholders align with sustainability goals and verifiable material provenance.



For a lot of organizations, sustainability is both a matter of compliance and a matter of competitive advantage: brands in particular are obviously keen to meet the requirements of regulations, but with consumer buying decisions being driven as much by values and transparency as by price and style, being verifiably more sustainable can translate into a direct market edge. It is difficult, though, for brands to benchmark themselves against their competitors, or to assess where they stand on key metrics. What is Lectra's approach to providing that kind of competitive intelligence? And what can brands do when they have access to that kind of sustainability decision-making power?

Lectra provides competitive intelligence through the Retviews platform, which also benchmarks sustainability performance against competitors. Retviews' AI enables brands to identify on-trend sustainable fabrics and product assortments and see how other brands are pricing their eco-friendly products. They can assess their standing on key sustainability metrics more easily as well as strategically improve their practices to appeal to value-driven consumers. It helps them to develop collections that are sustainable while being price-competitive and always stay one-step ahead.

With access to this data, brands can gain a market edge by enhancing their sustainability credentials, align production with demand and meet regulatory requirements.

With sustainability destined to bring sweeping changes to many different parts of the fashion value chain, it seems inevitable that some (or many) current ways of working will have a limited shelf life. Where do you see the industry changing the fastest and most acutely? What do we take for granted today that's unlikely to be viable in the future? And how can fashion businesses get ahead of that shift?

The industry is evolving most rapidly in material innovation and sustainable production processes. Practices like overproduction and wasteful manufacturing are becoming increasingly unviable. The future will demand precise demand forecasting, on-demand production, and sustainable material sourcing. Fashion businesses can get ahead by adopting Industry 4.0 technologies, like Lectra's connected cutting equipment and software, which minimizes fabric waste and reduces energy consumption. Embracing tools like Kubix Link, Retviews, and TextileGenesis ensures competitiveness and sustainability, helping businesses stay ahead of regulatory requirements and consumer expectations.

FOUNDED: 2008

Oritain is a global leader in scientific verification of product origin. Leading brands in industries as diverse as fashion and cotton, coffee, horticulture, meat, and dairy trust Oritain to help them achieve regulatory compliance, mitigate the risk of product fraud, and protect brand reputation through proving the provenance of their products.

Oritain is an enabler of positive change in the fashion sector, providing tools that allow businesses to operate their supply chains more sustainably, ethically and responsibly. Fashion brands using Oritain's isotopic testing have greater assurance around the origin of their cotton products and raw materials, ensuring that their sourcing processes don't involve unethical labour practices, and enabling compliance with legislation such as the UFLPA.

By providing independent, science-based verification of origin, Oritain helps brands meet their ESG commitments – both ensuring that raw materials don't originate from areas associated with deforestation, forced labour, or other environmental abuses, and providing quantifiable data around product origin to support measuring the environmental impact of their operations.

The unique Oritain methodology combines forensic science and data to analyze environmental factors and create a unique origin fingerprint which can be used to audit products throughout the supply chain to differentiate the legitimate from the fraudulent. The analysis is robust, accurate and highly resistant to being tampered with, replicated or destroyed, ensuring the integrity of products from farm to final sale.

Through employing Oritain's solutions, fashion businesses can communicate their progress and achievements towards sustainability goals with customers, regulators and other audiences with confidence.

Headline Customers

CONE DENIM

PATAGONIA

COTTON USA

PRIMARK

COUNTRY ROAD

RAMATEX GROUP

LACOSTE

SUPIMA

LOFTEX

WELSPUN

FOUNDED: 2008

TECHNOLOGY PARTNERSHIPS

Oritain adds deeper visibility to **EXISTING SUPPLY CHAIN SYSTEMS** by providing specific, data-driven insights through the testing of the product itself for verification. This information can be used to validate supply chain sourcing data and mitigate regulatory risks.

Our solution is **MANUFACTURER-FRIENDLY**, requiring no changes to processes or operations, and can be **INCORPORATED THROUGHOUT THE SUPPLY CHAIN** alongside other **MAPPING AND TRACEABILITY SOLUTIONS** to confirm that the origin data matches digital records.

What role do you see yourselves playing in both the short and longer term future of sustainability and supply chain transparency in fashion?

Over recent years, global supply chains have become more fragmented, opaque, and complex. As supply chains extend further across borders and involve more players, it's harder than ever for businesses to have complete visibility over their entire supply chain. That lack of visibility opens the door for potential product fraud, counterfeiting, and unethical practices like forced labour.

This is where Oritain plays such a pivotal role – to provide certainty and reassurance around product and supply chain integrity.

Oritain's Market Insights research tested 1,000 samples from over 40 retail fashion brands and revealed that 95% of the brands tested had at least one garment containing cotton from regions linked to forced labour.

As regulatory frameworks like the UFLPA, EUDR and CSDDD gain momentum, the cost of non-compliance includes both financial penalties and reputational damage, making it crucial for brands to have verifiable sourcing data.

The biggest risk to businesses is being unable to identify and address forced labour or other sustainability violations such as deforestation in their supply chains.

Oritain's unique science-based approach underpins sustainability by verifying the true origin of products and raw materials, empowering brands to operate more sustainably to protect the planet, its resources and its people.

In order to extend the benefits of its scientific origin verification solutions, Oritain continues to expand its capabilities into new industries, commodities and geographies. This includes the addition of testing for leather products, and the opening of a dedicated Singapore office by the end of 2024 to further support businesses operating in Asia-Pacific.

Contact





Strengthen Your Sustainability Claims with Oritain's Cotton Origin Verification.

Discover how Oritain can support your brand's commitment to sustainability.

[Learn more](#)





In conversation with

Dr
SAM LIND
*Science Solution
Architect*
ORITAIN

Last year, it emerged that “sustainability” was still a useful term for capturing a very complex set of variables and conditions. This year, we want to look at how those different elements are being arranged and prioritised. Upstream visibility and traceability, for instance, is a separate piece of the sustainability puzzle from textile-to-textile recycling, or material science, or the circular economy. With all these different parts vying for brands’ and suppliers’ attention, and legislation adding time and compliance pressure to the mix, how do you believe our readers should be thinking about prioritisation?

Prioritization should be based on company goals, aligned with what is achievable and what is going to drive the best outcomes for near-term objectives. The market at the moment is quite subdued, and there’s material out there that’s more readily available than in the past. So, a sourcing solution for a sustainability pathway seems to have greater advantages in the traceability. For a brand to source something, their suppliers need to source the raw material for it. Today, we’re at a lower point on the supply demand curve, so this is more achievable than it might have been in the last two years. It’s not a case of having one without the other. If you’re going down a sourcing journey for a greater sustainability mix, transparency will give you the confidence that it fits your sustainability goals.

Obviously interventions at every stage of the lifecycle matter, but with materials having such an outside contribution to how a product performs, how it looks, what it costs to produce, it feels logical to say that they are such a vital part of the product’s makeup overall that they must also be top of the pile when it comes to sustainability. Does that hold true? How much of a given product’s combined environmental and ethical impact is determined at the raw materials stage?

I’d argue that a majority would be established at the raw material stage. You have some choice regarding suppliers and facilities but, as we know, the largest contribution comes from the raw materials chosen for sourcing. Greater weight should be emphasised on the raw material source, as well as selecting the right supply chain partner(s).

For example, cotton is grown under different conditions worldwide, each with varying impacts on sustainability. The origin of the cotton, how it is cultivated, and the resources used – like water and pesticides – play an important role in determining the overall sustainability of the final product. Oritain takes a scientific, forensic approach to verify the origin of raw materials (like cotton) helping brands source materials from locations with sustainable or ethical practices.

A lot of time and effort is being expended on systems, processes, and technologies designed to track impact data across the extended product lifecycle, but these are only as good as the data that feeds them. So what is the right approach to beginning with rigorous scientific data about the origin of materials? And what impact can getting that method of initial data capture right have on the stages that follow?

The first thing is to define the objective data versus the subjective data. How is that information generated? Is it based on industry published data, objective data or is it relying on subjective evaluations from suppliers and declarations? I think that’s the first question, which is the basis on which you build a system and technology. If your system is based on subjective data, you’re going to get subjective results. If you have a good system grounded in objective information, you are going to get objective outcomes.

My advice would be to look towards technologies and systems that rely on objective information rather than the subjective viewpoint - subjective meaning supplier self-declarations, industry averaging, etc. Objective includes pontific sustainability goals. Any of these initiatives require a win-win situation for both the brand and the supplier. It needs to be beneficial for both parties. If your suppliers are true partners in business, then you must look at it as the potential for a win-win business transaction - particularly in the case of sustainability materials which are at the start of industry uptake. Some suppliers won’t want to take oversize risk into that unless they have a partner that’s going to stand by them for the long term.

The Oritain Process



Origin samples are collected and analyzed



Fingerprint of origin sample is determined



Client samples are tested against fingerprints to verify origin



Forensically verified results of a sample's origin are shared with the client

Much of the sustainability mandate is being driven by regulations, but the shape of those regulations is not fixed - and complying with them means remaining aware of when the letter of a legislation changes. Isotopic testing is playing a part in this progression, with entities like the European Union, United States, and Canada starting to adopt it as an enforcement mechanism against forced and child labour. How should fashion businesses be thinking about preparing for the future of disclosure and reporting?

They should prepare for the future first with clarity. You don't want to be in a position whereby you have some general assumptions about what you're doing and then have to walk it back. You should make commitments on the things that you have strong evidence for, strong objective data for and limit your scope to that and *then* look to expand that out. It helps no one by making vague commitments that are backed up by vague data.

As well as giving brands a key to tangible evidence around product origins and authenticity, science-backed traceability has the potential to deliver a return on investment in other areas - from risk to efficiency. What is your experience of where the industry is already finding additional value in isotopic testing, and where do you think further value will be found in the near future?

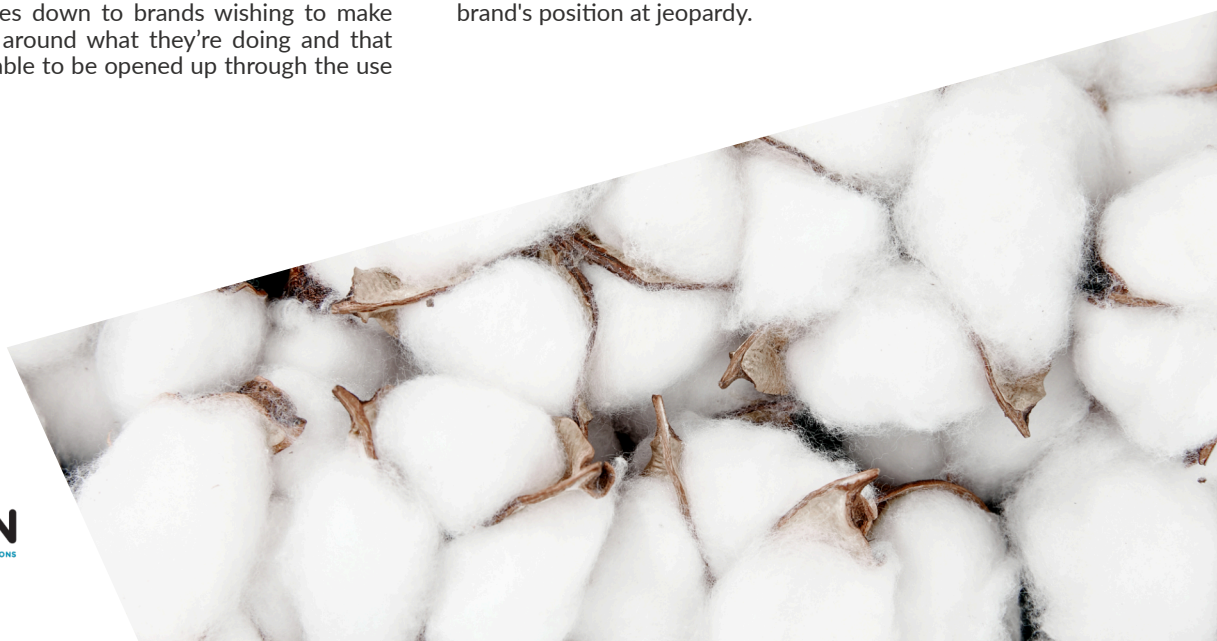
Sourcing needs to be true to source. The UFLPA regulation is around not using origins with certain banned materials in it. Other opportunities are available where you want to be true to source. So, if you're on the US Cotton Trust Protocol, are you sourcing US cotton? Are you looking to make particular content claims about your material, and how do you back them up? It really comes down to brands wishing to make greater content claims around what they're doing and that new opportunities are able to be opened up through the use of isotopic testing.

Textile and garment brands are turning to origin fingerprint forensics to authenticate their goods. Country Road, an Australian fashion brand, uses Oritain to scientifically verify the origin of the Australian cotton it uses in its clothing lines. Welspun, one of the world's largest home textile manufacturers and supplier to top global retailers and hotel chains, uses Oritain to uphold the integrity of their Egyptian cotton supply chain.

With sustainability destined to bring sweeping changes to many different parts of the fashion value chain, it seems inevitable that some (or many) current ways of working will have a limited shelf life. Where do you see the industry changing the fastest and most acutely? What do we take for granted today that's unlikely to be viable in the future? And how can fashion businesses get ahead of that shift?

I think the reliance on factory auditing as we're expanding the question set for that tool is going to have a shelf life. Auditing factories first started from understanding about working conditions and environmental credentials around those facilities - that is limited utility when we're now interested around the nature of the products that flow through those facilities. Programs that rely on indirect measures of sustainability accounting are always going to struggle in the face of a consumer promise, because a consumer is looking for a content claim, not a generalization of a brand's overall sourcing structure.

Tools and systems that sound great, but that are built on subjective data inputs or subjective decision making also have limited utility. Because there's limited fundamental basis on what those results can stand behind, and they can put a brand's position at jeopardy.





WWW.PTC.COM

FOUNDED: 1985

Retail brands are grappling with a dual sustainability challenge. First, they must meet the ambitious commitments outlined in their ESG reports. Second, they need to identify the right product sustainability data to ensure compliance with current and future regulations.

PTC's FlexPLM offers a comprehensive solution to these challenges by providing:

- **Regulatory Compliance Tools:** FlexPLM helps brands track and validate the data needed to meet country-specific regulations, including France's Anti-Waste Law, the NY Fashion Act and the EU Digital Product Passport legislation.
- **Sustainable Design Support:** The platform gives designers, product developers, and sourcing managers integrated access to sustainability metrics at the product, material, and supplier levels, enabling more informed and responsible eco-design decisions.
- **Real-Time ESG Analytics:** FlexPLM's analytics capabilities, including sustainability data integration, allow managers to monitor seasonal progress toward ESG goals in real-time, while also identifying products, materials, and suppliers with lower sustainability scores.

Headline Customers

PTC's FlexPLM customers are the world's most successful and well-known brands and retailers (**DISNEY, LULULEMON, NEW BALANCE, DR MARTENS, NIKE, LOWES, C&A, PRIMARK** just to name a few) many of whom are recognized as pioneers in retail sustainability.

For example, long-time FlexPLM customer **PATAGONIA** co-founded Cascale (formerly Sustainable Apparel Coalition, or SAC) a global, non-profit alliance of leading consumer goods brands and retailers with other long-time FlexPLM customers **LEVI'S, J.C. PENNEY, HANES, and MARKS & SPENCER.**

Additional FlexPLM customers—such as **BROOKS RUNNING, BURBERRY, RALPH LAUREN, SWEATY BETTY, VF** and **VIVIENNE WESTWOOD**—consistently top industry lists of the most environmentally-conscious retailers.

PRICING MODEL:

PTC does not disclose pricing information publicly.

We proudly support brands and retailers across diverse industry segments and product categories, including high fashion, luxury, footwear, sporting goods, outdoor, home décor, DIY, and consumer products.

Our robust supply chain capabilities set us apart. With more users in the supply chain than any other PLM vendor, FlexPLM is trusted by customers to drive digital connectivity across the value chain. This trust reflects the rate at which PTC's customer brands are seamlessly connecting with colleagues, suppliers, production facilities, sourcing offices, and mills, fostering enhanced collaboration, connectivity, and sustainability within a complex global supply chain ecosystem.



WWW.PTC.COM

300,000
RETAIL PLM
USERS

1,500
ICONIC CUSTOMER
BRANDS

FOUNDED: 1985

INTERNAL
USERS:

NORTH AMERICA 50 %
LATAM 5 %
EMEA 35 %
APAC 10 %

EXTERNAL
USERS:

NORTH AMERICA 5 %
LATAM 10 %
EMEA 5 %
APAC 80 %

10+

TECHNOLOGY
PARTNERSHIPS
INCLUDING:

BROWZWEAR
CLO
FIRST INSIGHT

INSPECTORIO
MAKERSIGHTS
MATERIAL EXCHANGE

SEDDI
TEXTILE EXCHANGE
TRADEBEYOND

TRUSTRACE
WORLDLY

What role do you see yourselves playing in both the short and longer term future of sustainability and supply chain transparency in fashion?

With over 20 years of experience and collaboration with thousands of leading brands, PTC has developed an unparalleled understanding of the complexities involved in creating and implementing a successful PLM sustainability strategy.

Our customers frequently turn to us for guidance on integrating PLM into their broader corporate ESG strategies. This includes advising on how to:

- Select the most effective third-party solutions to support their sustainability initiatives.
- Integrate and manage external sustainability data, such as scope certificates, social compliance audits, and material traceability.
- Scale digital product creation activities to meet sustainability goals.
- Utilize AI to drive informed sustainability decisions.
- Embed sustainability considerations into the planning and design processes.

Many of our retail customers actively participate in PTC's Sustainability Working Group, which serves as a platform for sharing common challenges, strategies, tactics, and best practices in sustainability.

As a trusted strategic partner, PTC works closely with our customers' corporate sustainability teams to achieve tangible outcomes. We provide expert advice on leveraging PLM and best-in-class sustainability solutions to support their ESG initiatives and operational goals.

Contact



Accelerate Compliance Readiness

PTC manages your sustainability, certification, and compliance data to support ever-changing global, regional, and local legislation, enabling you to meet growing consumer demand for sustainable and ethically sourced products.

The only premier partner of:

worldlyTM

ptc[®] flex plm



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In conversation with

KYLE MARDEN

*Vice President,
Retail Business
Unit*

PTC



Last year, it emerged that “sustainability” was still a useful term for capturing a very complex set of variables and conditions. This year, we want to look at how those different elements are being arranged and prioritized. Upstream visibility and traceability, for instance, is a separate piece of the sustainability puzzle from textile-to-textile recycling, or material science, or the circular economy. With all these different parts vying for brands’ and suppliers’ attention, and legislation adding time and compliance pressure to the mix, how do you believe our readers should be thinking about prioritisation?

I think it’s critical to remember that there are two central objectives that sit above all the potentially different directions that brand and retail organizations can go. These are:

- A steep, quantifiable reduction in fashion’s environmental impact.
- Measurable progress towards more equal treatment of people upstream and downstream.

While it’s critical for every business to determine where it wants to focus its efforts, it’s equally vital that every action ladders up to a real return on investment that’s measured by one of those two yardsticks.

It’s also essential to remember that making a measurable difference is no longer optional; different stakeholders are already holding brands and retailers accountable in a way that’s trended upwards even over just the last twelve months. Investors continue to seek out brands that have clear ESG and CSR strategies, and retail partners and consumers are prioritizing “sustainable” products and brands more than ever. And of course the regulatory bar has continued to rise over the past year, with more organizations than ever falling into the reach of legislation in Europe, the UK, and the USA, and more scrutiny being applied to those companies that were already in-scope.

Most of the global retailers and brands PTC works with are preparing to satisfy the data requirements of current legislation, while anticipating the requirements of future legislation. Their most pressing task is to determine what types of material, product and supplier data they will need to collect and validate to satisfy the existing French AGEC law, and to be ready for the Ecodesign for Sustainable Product Regulation (ESPR) mandate to go into effect for all textile products sold in the EU by 2027-2028.

Although not final, it is expected that ESPR will require Digital Product Passports to include:

- The country of origin and composition of every material that goes into the product.
- The processes used to manufacture both the raw materials and the finished product.
- A full accounting of the environmental impact of those processes (e.g., CO2 emissions, water usage, waste generated).
- Applicable product and material certifications (e.g., Fair Trade, FSG).
- Full transparency of each vendor in the supply chain (e.g., compliance with Forced Labor, Living Wages, and other UN Human Rights standards).
- Product and Material Circularity information.

The first priority is for retailers and brands to identify gaps in the data they have and to evaluate the accuracy of that data. After completing this gap analysis, the priority should be developing strategies for closing data gaps and improving the accuracy of all data.

What role can PLM play in delivering that more measurable kind of value?

Every other month, 15 global companies participate in PTC's Retail Sustainability Working Group. The purpose of the group is to develop best practice approaches for leveraging PLM to support their ESG initiatives. For the past year, the group has focused on three topics:

1. **Consolidating sustainability data in PLM.** Most of our customers view PLM as the system of record for all material, product, and supplier data. This naturally includes sustainability data—whether it is adding traceability results to products, uploading certificates to materials, or pulling Worldly FEM scores into supplier records.
2. **Compliance tracking.** This starts with dynamically creating a checklist of required data tailored to the specific attributes of a product (e.g., composition, where sold). Users can then track the completion of this checklist as data is brought into PLM.
3. **Driving eco-design decisions.** As designers make decisions about which materials to include in a product BOM, retailers would like for them to see side-by-side comparisons of each material and each material supplier's environmental impact scores.

The first two topics support regulatory compliance initiatives, while the third one supports attaining corporate ESG goals.

So as you can see, everything we've just talked about, in terms of measuring value, has data as a central currency. Whether it's investing in social and ethical initiatives, or in driving down the lifecycle impact of a particular product or category, the only way to quantify improvement is to benchmark the way things stand, and to then measure how they change.

At the product and supply chain level, this is absolutely in the wheelhouse of enterprise PLM - and it's something we know PTC FlexPLM is especially well-equipped to do. We have worked for decades, alongside the most successful names in fashion, footwear, retail and consumer products to make sure that our platforms are reliable, scalable, and extensible in a way that captures and creates business-wide value from the full spectrum of data across design, development, and sourcing.

When everything lives in a single, centralized, bulletproof source of truth - from critical product data to chain of custody information - we're talking about making a massive difference in a company's ability to not just measure their sustainability successes, but to execute on them in the first place.

What kind of impact can better eco-design decisions really have on a retailer or brand's ESG goals?

Almost every retailer and fashion brand have publicly committed to GHG emission-reduction targets—typically 30-50 percent by 2030. Purchased Goods and Services is the largest source of retail GHG emissions, primarily driven by raw material sourcing and processing. This means that making a real dent in their carbon footprint requires retailers to switch to more sustainably-sourced and sustainably-manufactured materials.

The Worldly FEM assessment includes normalized GHG emissions data for each factory (kg CO₂ per unit). Passing this data to factory records in PLM allows sourcing managers to see the per unit impact of choosing one supplier over another. In an analysis of several hundred identical materials with multiple suppliers, PTC found that choosing the material supplier with the lowest normalized CO₂ leads to a 51 percent average reduction in CO₂ per unit.



What's fundamentally unique about PLM that isn't achievable, for instance, with spreadsheets and databases? And what can companies potentially build on top of PLM that they couldn't otherwise?

This is something forward-thinking PLM companies have been talking about for a long time: the idea that there's a difference between what I've referred to as "digital dead-ends" and engines for digital transformation like PLM. The urgent drive for sustainability is bringing this discussion back to the forefront, but it's not a new conversation.

For a brand that hasn't systematized their key product data or their information and insights they will need to achieve their sustainability objectives, the key data will usually live in spreadsheets, emails, static PDFs, and other repositories that are disconnected from the rest of the product lifecycle. However, a company at that stage of digital maturity chooses to prioritise their investments in sustainability, each initiative will, by definition, have to start with understanding where the information actually lives - and the answer will almost always be that it lives in too many different places to be fit for purpose.

So the next step will always be to understand whether that data can be centralized, normalized, and understood. This is a necessity for anything a business wants to accomplish in the realm of transparency, accountability, and disclosure. As a company, you have to have confidence in your knowledge base before you can make confident outward commitments about it.

This is something that enterprise PLM has been extremely good at, at scale, for a while. We know that more than 300,000 people use PTC FlexPLM every day, for example, to work with properly centralised and systematised product data, bills of materials, supplier information, planning data, and other vital content. Our team is also actively working with some of the leading brand and retail businesses in the world to make sure that the same capabilities can be seamlessly extended to the full spectrum of new data points that will matter in the sustainability age.

And finally, companies looking to build AI, analytics, and insights platforms on top of disconnected data sources will encounter a series of roadblocks, whereas PLM users will be starting from the best possible foundations. This is something we're also seeing first-hand, as our users get deeper into new functionality like our Flex Insights platform and other ways of building new possibilities on top of foundational data that is clear, consistent, and centralised.

We've focused on value and data so far through a very brand-specific lens, but what is your perspective on how technology (particularly PLM) can support the supply chain actors who will be essential to delivering on sustainability targets - but who are also at the most risk of both environmental and ethical impacts?

It's critical to understand that, when we talk about "risk" in fashion and retail, we as an industry tend to concentrate exclusively on the risk to brands and retailers themselves. But as you pointed out, there can be business continuity risks for companies throughout the supply chain that range from commercial to existential.

At PTC, we believe the right way to start building resilience against those risks is to provide those supply-side companies with the same foundational technology support and the same access to actionable information - allowing them to communicate and collaborate with their brand and retail customers in a way that's secure, connected and accountable.

This has always been our philosophy, and it's the reason that PTC FlexPLM is used by more companies across the global supply chain - from manufacturing businesses and sourcing offices to mills and material development partners - than any other PLM platform. Today, there are more than 75,000 FlexPLM users in the extended worldwide value chain, and that number is increasing every day.

With sustainability destined to bring sweeping changes to many different parts of the fashion value chain, it seems inevitable that some (or many) current ways of working will have a limited shelf life. Where do you see the industry changing the fastest and most acutely? What do we take for granted today that's unlikely to be viable in the future? And how can fashion businesses get ahead of that shift?

Many retailers we have been working closely with acknowledge that change management is a big issue for both their internal product teams and their suppliers.

Internally, a greater focus on reducing emissions in raw materials and material construction will require capturing and analyzing processes at the fibre-level. This means that material designers and material suppliers will need to enter a whole new set of attributes—such as denier and yarn formation method—for each fibre that goes into each material into PLM. Visibility will require adding tier three, tier four, etc. suppliers to supplier libraries, while traceability will require connecting those supplier tiers to the materials and products being produced. Capturing each of these new data points in PLM is no small task for retailers with tens of thousands of existing materials and thousands of tier one and tier two suppliers.

Suppliers are already expected to complete social compliance audits and factory assessments like the Higg FEM. As adoption of traceability solutions becomes mandatory, much of this additional data collection will also fall on the suppliers. It does not stop with just collecting data: more and more retailers are pushing their suppliers to make tangible commitments to reduce their emissions.

We're already seeing a strong trend towards those companies looking to build visibility where it doesn't exist, and to bring information and insights back in-house, so I think it's fair to say that the companies making those investments (and many of them are FlexPLM customers who value our role as an enterprise-grade, solution-agnostic technology partner to the most iconic brands in the world) are the ones getting ahead of the game.





WWW.TRADEBEYOND.COM

FOUNDED: 2010

TradeBeyond's multi-enterprise supply chain platform streamlines product development, allowing retailers and brands to deliver products to market more quickly, efficiently, and responsibly. Our modular platform optimizes all supply chain processes – development (PLM), sourcing, supplier management, order management, quality, and logistics – while automating workflows, improving data quality and timeliness, and facilitating collaboration between internal departments and external supply chain partners.

TradeBeyond distinguishes itself from other supply chain platforms not only in its scope, but also its unrivaled emphasis on sustainability. TradeBeyond empowers fashion retailers to meet their ESG/ Sustainability goals by introducing transparency and creating quality checkpoints throughout the product development and supplier management processes. Our system monitors suppliers and introduces complete visibility into a business's entire supply chain while mitigating compliance risks. From supply chain mapping to chain of custody documentation, carbon emissions reduction and environmental impact measurement, our solutions ensure social and environmental sustainability by going beyond the requirements of both current and impending supply chain regulations, including the Uyghur Forced Labor Protection Act (UFLPA), the German Supply Chain Act, and the European Supply Chain Due Diligence Directive. We hear all the time from our customers that other platforms on the market are too narrowly targeted, and we long ago recognized the need for a comprehensive platform that can seamlessly manage all of a business's sustainability priorities under a single login.

Headline Customers

Retailers

AUCHAN
B.U.T.
CANADIAN TIRE
ELECTRO DEPOT
HOME DEPOT
INTERSPORT

K-MART
AUSTRALIA
NORDSTROM
OTTO GROUP
PARTY CITY
PEPCO

PETCO
PETSMART
SAFEWAY
SPENCER GIFTS
TARGET
WALGREENS

Brands

ADIDAS
AMERICAN EAGLE
OUTFITTERS
ASICS
BRILONER
C&A

DR. MARTENS
FABLETICS
HUGO BOSS
KIABI
LULULEMON

MICHAEL KORS
OAKLEY
REI
THE WAREHOUSE
UNDER ARMOUR

PRICING MODEL:

Primary Pricing model: Per user subscription based; multi-tenant SaaS

Supply chain segment targeted: TradeBeyond delivers an end-to-end modular platform targeting all supply chain workflows, including supplier management, product design/creation and development, sourcing, order management, quality testing and auditing, and logistics.

Main target: Global retailers and brands committed to significantly scaling private label assortments and international direct sourcing.



WWW.TRADEBEYOND.COM

FOUNDED: 2010

INTERNAL
MONTHLY
ACTIVE
USERS

35,000

45,000

EXTERNAL
MONTHLY
ACTIVE
USERS

NORTH
AMERICA

20%

EMEA

30%

APAC

50%

NORTH
AMERICA

1%

EMEA

1%

APAC

98%

15+

TECHNOLOGY
PARTNERSHIPS
INCLUDING:

ERP systems

ORACLE
SAP
DYNAMICS 365
NETSUITE

3D / 2D design

ADOBE ILLUSTRATOR
BROWZWEAR
CLOVISE

ESG

AMFORI
WRAP
WORLDLY / HIGG
RESET CARBON

Testing / Inspection /
Compliance

QIMA
SGS
BUREAU VERITAS

What role do you see yourselves playing in both the short and longer term future of sustainability and supply chain transparency in fashion?

Our solutions are already integral for ensuring sustainability and will only become more so going forward as retailers continue to hold themselves to higher standards. TradeBeyond facilitates responsible sourcing in a multitude of ways, including through transparency and traceability (by way of supply chain mapping and chain of custody tracking and documentation), supplier chain monitoring, environmental impact measurement, and safeguards that prevent businesses from sourcing from high-risk suppliers. Our traceability tools allow apparel companies to track the origin and transformation of every material component, from the cotton farm to the gin, spinner, and factory, and to calculate the environmental impact of products during specification. We are pioneers in integrating the latest AI technologies to accelerate and improve companies' sustainability efforts.

TradeBeyond's platform also leverages seamless integrations with sustainability databases and consultancies like amfori, Worldly, WRAP, and RESET Carbon, so companies are always working from the most timely data and insights. Our approach to sustainability is more comprehensive than anything else on the market, and we're proud of the success that our multi-enterprise platform has had in empowering brands and retailers to eliminate forced labor and child labor from their supply chains, reduce greenhouse gas emissions, and mitigate their water, energy, and cotton consumption. But we also believe the work is never done. Our platform is adaptable by design, and we've built it to evolve alongside ever-changing ESG best practices. Sustainability will remain a top concern for the fashion industry going forward, and we see TradeBeyond as the supply chain platform of choice for brands and retailers making a permanent commitment to responsible fashion.

Contact

Simplifying Fashion Traceability With AI



www.tradebeyond.com

For Free Sourcing
Insights, Scan Here:





In conversation with

MICHAEL
HUNG

CEO

TradeBeyond

Last year, it emerged that “sustainability” was still a useful term for capturing a very complex set of variables and conditions. This year, we want to look at how those different elements are being arranged and prioritised. Upstream visibility and traceability, for instance, is a separate piece of the sustainability puzzle from textile-to-textile recycling, or material science, or the circular economy. With all these different parts vying for brands’ and suppliers’ attention, and legislation adding time and compliance pressure to the mix, how do you believe our readers should be thinking about prioritisation?

Sustainability isn’t just about tackling individual concerns. It’s about understanding how various initiatives interconnect and align with strategic goals. The challenge is balancing immediate compliance demands with a long-term vision that includes upstream visibility, material innovation, and circular economy practices, at the level and depth required to align with the organization’s priorities.

In light of regulations like the EU’s Corporate Sustainability Reporting Directive, the Corporate Sustainability Due Diligence Directive, and the U.S. Uyghur Forced Labor Prevention Act, brands must have full transparency across their supply chains, down to the raw material level. Until recently, this kind of transparency was far out of reach for most fashion retailers, but TradeBeyond has introduced first-of-its-kind [AI-powered traceability tools](#) which, coupled with our leading supplier mapping capabilities, help brands map their supply chains and create detailed chain of custody documentation for every product they source.

This traceability not only addresses apparel’s most immediate compliance concerns but sets the foundation for all future

sustainability practices. Textile-to-textile recycling and material science, for instance, introduce significant environmental benefits, but these innovations must be integrated with broader supply chain transparency. Knowing the origins and lifecycle impacts of materials allows companies to make smarter recycling and material use decisions. The circular economy, too, requires robust data management and traceability. Transitioning to a circular model demands a deep understanding of each product lifecycle stage, which relies on significantly better management of information and data along the full value chain. At TradeBeyond, we view initiatives like the circular supply chain as a continuum of real-time data, enabling effective decision-making and marked improvements in overall sustainability.

A big part of sustainability, from the brand perspective, is mapping and understanding risk. This is not a small challenge when we consider the complexity of global supply chains, and the different dimensions of impact modelling across environmental and ethical. Managing that sort of multi-faceted complexity seems like a potential use-case for AI. Do you see that potential? And if so, how are you seeing businesses making use of it to tackle the challenges of risk?

There’s no mistaking the potential of AI in this area. AI is crucial for managing the complexities of sustainability-related risks in global supply chains. The vast amount of data it can consider—from carbon emissions to product risk factors—makes AI indispensable for brands seeking to mitigate effectively environmental and ethical vulnerabilities across all tiers of their supply chain.

AI can quickly process and analyze large data sets, identifying patterns and anomalies that manual methods can’t catch. Our

AI-driven traceability tools allow brands to monitor their supply chains in real-time, mapping each tier down to the raw material level. This capability is vital for identifying high-risk suppliers and ensuring compliance with stringent regulations. AI's predictive analytics also enable businesses to [forecast risks based on historical data](#), addressing issues before they escalate.

Many fashion companies are already integrating AI into their risk management strategies with notable success. AI-powered platforms cross-reference supplier data with global risk databases, automatically flagging potential ethical or environmental violations. This streamlines compliance and enhances transparency, which is increasingly important as consumers demand more accountability from brands. By automating the identification of ethical or environmental violations, this real-time analysis allows companies to address issues proactively, ensuring compliance with evolving regulations and supporting more informed decision-making.

It's fair to say that implementing AI is not going to be straightforward, for a range of technical and cultural reasons. Have you seen organisations encounter any problems in rolling out AI capabilities in risk management and overall sustainability initiatives? What strategies have proven effective in mitigating those hurdles?

Retail businesses are understandably excited about the promise of AI. This summer we conducted a survey that found implementing AI is the most cited priority for supply chain leaders, with 28% citing it as their top priority over the next three years. But without the necessary digital infrastructure, they won't be able to take full advantage of AI's potential. A significant hurdle is the lack of a centralized, accurate, and organized data repository. AI thrives on data, and without a robust foundation, AI's insights and efficiencies fall short. Companies often face fragmented data sources—PO, SKU, factory-level information, and supplier data spread across multiple platforms—leading to inconsistencies and unreliable AI predictions. TradeBeyond's AI chain of custody toolkit addresses this by automatically scanning and assessing all documents, detecting potential compliance risks, and cross-referencing shipment details against databases of blacklisted entities, ensuring early detection of compliance issues. This ensures that all documentation is ready for customs, allowing retailers to avoid significant delays and potential fines.

Digitalization is the first step to overcoming this challenge. Brands need to build a central repository for all supply chain data, from early-stage planning to sourcing, costing, and logistics. A multi-enterprise platform like TradeBeyond facilitates this, ensuring data is current and accessible for all stakeholders. A vast, centralized data lake sets the stage for AI to function optimally, enabling real-time monitoring, predictive analytics, and automated decision-making.

Cultural and technical adaptation also pose challenges. Many organizations underestimate the learning curve associated with AI tools and the need for cross-departmental collaboration. Success lies in prioritizing training and change management, ensuring teams are equipped to work with AI systems and act on the insights they generate.

As powerful as technology can be, it's only part of the sustainability picture. Building the right company culture to support sustainability actions and to power genuine collaboration is going to be key. How do you think those two elements – digital transformation and cultural evolution – can support one another, and help deliver a near-term future where professionals at every level of fashion can contribute in a meaningful way to sustainability objectives?

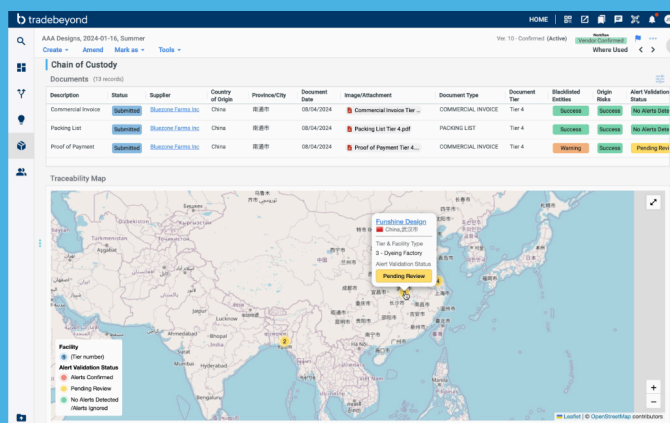
Culture and technology must work hand-in-hand to drive meaningful and lasting change within an organization. Especially in the fashion industry, where traditional practices are deeply rooted, achieving a significant cultural shift requires deep, organization-wide behavioral change. This can cause resistance among employees, who may feel that their previous efforts are being invalidated or may fear the uncertainty that comes with new objectives.

To address these concerns, it's essential to reassure employees, from designers to supply chain managers, that their past contributions were valuable while also framing the need for change as a pathway to becoming a more responsible and sustainable brand. This not only preserves morale but also sets the stage for a successful transition to new sustainability goals, such as ensuring ethical sourcing and embracing circular fashion.

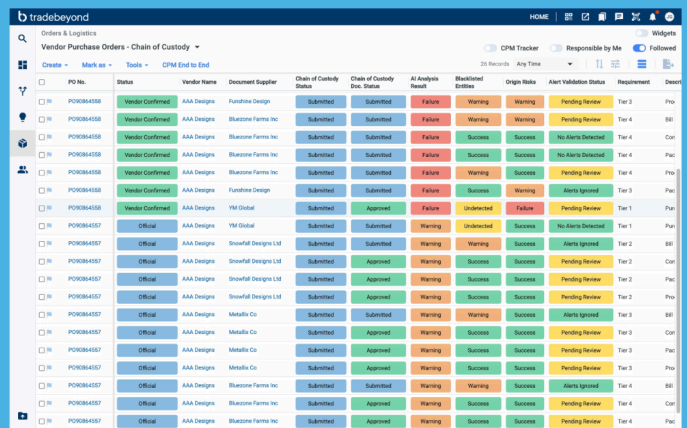
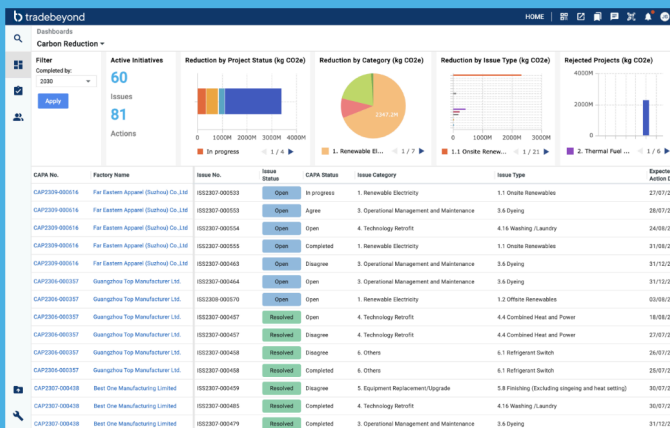
Technology is critical in this transition. As highlighted in our latest [Retail Sourcing Report](#), driving a sustainable future in fashion goes beyond adopting new technologies; it requires embedding these changes into the organizational culture. Platforms like TradeBeyond provide robust support with

Description	Chain of Custody Status	Supplier	Origin Risk	Blacklisted Entities
Tier 1	Approved	YIM Global	Failed	Undetected
Purchase Order	Approved	YIM Global	Failed	Undetected
Tier 2	Subscribed	Unswell Designs Ltd	Failed	Warning
Bill of Lading	Subscribed	Unswell Designs Ltd	Failed	Warning
Commercial Invoice	Subscribed	Unswell Designs Ltd	Failed	Warning
Packing List	Subscribed	Unswell Designs Ltd	Failed	Warning
Proof of Payment	Subscribed	Unswell Designs Ltd	Warning	Warning
Tier 3	Subscribed	Funshine Design	Warning	Warning
Bill of Lading	Subscribed	Funshine Design	Warning	Warning
Commercial Invoice	Subscribed	Funshine Design	Warning	Warning
Packing List	Subscribed	Funshine Design	Warning	Warning
Proof of Payment	Subscribed	Funshine Design	Warning	Warning
Tier 4	Subscribed	Funshine Design	Warning	Warning

TradeBeyond Chain of Custody Scan Results & Summary



TradeBeyond Chain of Custody Traceability Map



features like AI-powered chain of custody and carbon impact tracking, building them into existing workflows specific to fashion production and sourcing. These tools make it easier for employees to adopt new, sustainability-focused behaviors by embedding these practices into efficient processes. As employees begin to see success in their new roles—whether it's through streamlined processes or improved sustainability metrics such as reduced waste in garment production—they gain confidence and a sense of accomplishment, which helps to drive the cultural shift.

One additional challenge for this cultural shift is overcoming the stigma that AI, essential for deeper sustainability initiatives, is a job killer. To counter this, TradeBeyond's approach to AI emphasizes value creation and progressive implementation, demonstrating that AI can enhance job roles rather than replace them. This helps to mitigate resistance and fosters a culture where technology and human effort are seen as complementary forces driving the company's sustainability agenda.

From your vantage point, you must have an idea of where the industry is falling behind on its sustainability targets. What are the areas where brands and retailers need to focus in order to catch up with regulations, consumer expectations, and ethical standards?

One critical area where the fashion industry struggles is managing Scope 3 carbon emissions, which represent the largest portion of a brand's carbon footprint. These emissions, often misunderstood and poorly managed, leave brands vulnerable to regulatory non-compliance and reputational risks. The regulatory landscape is becoming increasingly stringent with laws like the EU's CSRD, which mandates detailed reporting on Scope 3 emissions, and the upcoming SEC climate disclosure rules in the U.S., which are expected to require companies to disclose their entire carbon footprint, including Scope 3 emissions.

To effectively monitor and reduce Scope 3 emissions, brands need a robust data foundation. TradeBeyond's [CBX Carbon Impact](#) tool provides a comprehensive framework for tracking and reducing supplier emissions, from energy consumption to industrial processes and wastewater. By automating data collection from suppliers and integrating it into a centralized platform, CBX Carbon Impact simplifies the management and reporting of Scope 3 emissions, ensuring compliance and transparency. Its interactive dashboards centralize data for easy

access, offering insights into energy efficiency and emission reductions to help meet targets. The platform also supports corrective action plans, enabling brands to collaborate with suppliers on improving efficiency and reducing emissions.

With sustainability destined to bring sweeping changes to many different parts of the fashion value chain, it seems inevitable that some (or many) current ways of working will have a limited shelf life. Where do you see the industry changing the fastest and most acutely? What do we take for granted today that's unlikely to be viable in the future? And how can fashion businesses get ahead of that shift?

The fashion industry is rapidly transforming, particularly in supply chain management. A significant change is the growing demand for digital transparency. Brands can no longer afford limited insight into their suppliers' practices. New regulations demand clear, traceable records of every stage in production, driving the adoption of advanced traceability tools that ensure real-time visibility and compliance.

Consumer expectations around product life cycles are also shifting. The traditional linear model of fashion is being replaced by a more sustainable, circular approach. Consumers now demand products designed for longevity, reuse, and recycling. Brands that innovate by integrating circularity into their offerings will not only meet regulatory demands but deliver on increasing consumer expectations for responsible practices.

The fashion industry, as one of the most polluting and wasteful sectors, faces significant challenges due to its reliance on low-cost manufacturing regions where environmental impact has often been overlooked. Brands must also embrace a daring transparency in their sustainability efforts, clearly communicating both their successes and the areas needing improvement. This honest approach is crucial for building credibility and avoiding accusations of greenwashing. Collecting and organizing full value chain data accurately will be essential for brands to report their sustainability performance effectively.

Despite these challenges, it's been inspiring to watch as the industry has moved from reactive compliance to proactive sustainability leadership. Sustainability is no longer just about meeting standards, but about driving long-term value. Companies that embrace this shift, using tools like TradeBeyond to embed sustainability into every aspect of their operations, will lead the industry into the future.

MARKET ANALYSIS

IS TECHNOLOGY BUILDING A
BEDROCK FOR SUSTAINABILITY?



THE DEMAND FOR SUSTAINABILITY SOLUTIONS

The landscape of sustainability solutions is continuing to take shape. And like a lot of software categories, the map for the development of the incredibly broad category of “sustainability tech” is being constantly drawn and redrawn as the world around it changes.

As we publish this report, in the autumn of 2024, peering forward into 2025, the demand for tools, systems, processes, and best practices to support traceability and transparency, and to provide a scaffolding for environmental and humanitarian progress is informed by a snapshot of different forces. A year or two from now, it may look different as market forces change - and as the end users of those tools interact with the creators of them to define, together, how to walk the meandering road that's being laid out in front of them.

That change will be shaped by evolving legislation and enforcement, consumer sentiment and price-sensitivity, micro and macro fluctuations in retail demand and upstream supply, potential leapfrog innovations in material science and recycling scale, and the inherent unpredictability of global trade and climate change.

What has not changed since The Interline last produced a Sustainability Report (in the fall of 2023), and what is not going to change a year, or even five years, from now is the general direction of sustainability as a catch-all term for a fundamentally different way of doing business - one that's built on transparency, disclosure, decarbonisation, impact minimisation, circularity, equality, and accountability. This remains “the mission”.

Taken together, though, all those different pieces constitute a dramatic change in how the industry works. The mission is an unprecedented one in scale and urgency. Today, the average fashion value chain is, on aggregate, the opposite of all those things: opaque; lacking the visibility and the data required for openness; heavy in its footprint across raw material extraction and processing, product creation, distribution, and waste; linear; unbalanced; and largely unaccountable and accustomed to self-regulation.

Even in isolation, picking just one of these elements to go after is a major task - and one that quickly reveals just how interrelated each of them is. Visibility begets greater awareness, which demands greater action, and so on. For most brand and retail businesses, tackling sustainability - with or without the support of one or more technology solutions - looks less like a steady ramp-up and more like a vertical, never-ending cliff-face.

This is also before we consider that each of these individual challenges will inevitably chafe against the commercial side of running a fashion business. While there is good reason to believe that progress towards sustainability can lead to better margins, and while the likelihood is that mandatory compliance will make the idea of optionality a moot point sooner or later, the reality remains that fashion must invest in one or more different facets of sustainability before it will deliver a return.

And the prevailing industry sentiment, on every side of the aisle, is that assigning a good share of that investment to adopting technology and improving processes is going to move the needle the furthest, the fastest.

As we wrote in 2023, though, the technologies that will be the recipients of that investment have been under what we called “heavy construction”. At the time of our last Sustainability Report, it was clear that there was no single, one-stop, sustainability solution that readers could go out and buy. That may be starting to change now, towards the end of 2024, as more mature platforms begin to combine disparate elements of sustainability under one roof. But on average it remains the case that companies wishing to build pieces of traceability, and stack them up to achieve transparency and full accountability, are shopping for a technology ecosystem - not a single solution.

The most marked change we have seen in the past year has, in that context, been the emergence of a clearer delineation between the different features and the different positioning of sustainability platforms - even if that clarity does not always come across in the way those platforms are marketed, or how their functionality is deployed.



BACKEND VS. FRONTEND

As a brand or retail business shopping for technology to support your sustainability efforts, perhaps the most appropriate way to frame that buying decision - and to align your strategy and roll-out with the real demands of the market, and the genuine capabilities of software and solutions - is to look at it through the lens of deliverables.

For your organisation, this means a digital product passport, a disclosure statement, a public-facing commitment, a competitive edge in a values-driven market, or a binding declaration of regulatory compliance. These are the target *outcomes* of sustainability strategies and the technology-buying decisions they drive - at least in the near term.

These outcomes and deliverables, though, are not things that technology vendors sell directly. The solutions, platforms, and tools that make up the market for sustainability software are a means to execute on those deliverables. They provide capabilities to map, model, measure, manage, and mitigate, which are intended to ladder up to giving end users the kind of actionable primary data that they need in order to produce their deliverables.

How different solutions, platforms, and services approach those capabilities (and especially how they present them to prospective customers) is where we are starting to see more distinct categories of solutions emerge: frontend and backend. These are notably not categories that technology companies themselves adopt; instead, these represent the most useful way we at The Interline have found of segmenting what different sustainability solutions actually aim to do.

Frontend solutions are, as the name suggests, primarily focused on providing users with ways to roll up, visualise, and package data - from raw material provenance and composition, to a lifetime carbon footprint. The user of these kinds of solutions can be essentially any role that has a need to analyse, understand, act upon, communicate or disclose data pertaining to the journey of a product.

Whether that data comes from pre-existing solutions (notably systems like PLM, which have the potential to house a treasure trove of data from inside and around a product's journey) or from newly-implemented tools that capture data directly at the source, at one or more links in the value chain, frontend tools are designed to present it, synthesise insights from it, and allow those insights to be condensed into deliverables - either directly or indirectly.

What frontend solutions do *not* tend to do is capture or source that data in the first place. This is primarily left to partners (either through ready-made integrations, or through intermediary data warehouses and similar platforms) or to users to provide their own inputs.

Backend solutions, by contrast, mostly do the opposite: focus on capturing or sourcing first-hand, objective data through scientific methods, through mathematical modelling, through fibre-forward embedded traceability and so on. These are, in effect, the infrastructure for sustainability, whereas the frontend solutions are analogous to the application layer.

While the lines between these two categories is blurrier in real life than this idealised separation, a useful encapsulation is the market for digital product passport (DPP) providers, whose products and services are designed to allow customers to create and populate DPPs in the right format and with the right content to comply with regional legislation, but who often also rely on the input of backend traceability platforms and processes to create the data in the first place.

In the market for sustainability technology, both front and backend solutions have value - especially when combined. Taken together, they allow fashion brands and retailers to retrieve, centralise, analyse, use, and communicate critical supply chain information and product-level attributes - and then to put the insights and actionable data derived from all of that at the fingertips of a broad spectrum of end users, across the full product lifecycle.

For obvious reasons, we are beginning to see more backend solution companies also building or acquiring compelling frontend experiences, simply because this represents a much simpler road to travel than the alternative. Backend solution providers who have their part of the infrastructure already constructed, and their reach into the upstream supply chain consolidated, can layer interfaces and experiences on top more easily than pure frontend providers can forge the foundations and the partnerships they need to populate their platforms.

Nevertheless, we are observing a trend of frontend solutions being sold as though they contain backend capabilities, or marketed without acknowledging the requirement for the customer to either provide their own primary data or lean into the wider ecosystem of solutions to source it. While these are the exception rather than the rule, these platforms are either implicitly or explicitly being positioned as having the entire sustainability solution ecosystem in one place.

This is not necessarily a problem for brands that buy with their eyes open - and brands who already have the right primary data, the right documentation for chains of custody, the right certificates, and the right partnerships to populate those frontend tools. For companies that understand they are purchasing a way to aggregate, roll up, analyse, visualise, and communicate data they already have access to, this approach is logical.

The concern we have, instead, is that brands will purchase frontend-only solutions and only afterwards realise that, while they solve for aggregation, packaging, and presentation of data that's critical to their deliverables, they do not, by themselves, contain or directly facilitate the capture of that data. Avoiding this outcome will be a matter of education for industry analysts, technology providers, and brand and retail businesses themselves.





There is, also, a grey area in between the two solution categories, where we find frontend technology providers who also have a big service component to their business, which handles the aforementioned capturing and structuring of data. This is a workable approach - again, provided that the nature of the partnership is clear to the customer buying into it - since it bundles an intuitive solution for visualising and analysing information, and access to agents who will help gather that information, including multi-tier supply chain mapping, inspection certificates and audiences, risk analysis etc.. It does not, obviously, constitute automation and infrastructure the same way that a combination of frontend and backend technology would.

More generally, we also see crossover between these two spaces. So, for the purposes of deciding how to approach the software market, brands should be asking themselves what balance of frontend and backend capabilities they need. They should also remain aware that a solution promising to give them unmatched new insights about their supply chains and the journey and composition of their products, must either include the ability to gather the data behind those insights at speed and scale, or that it integrates with one or more first-party data capture or foundational solutions they already use.

PRICING AND DEPLOYMENT

At the frontend level, sustainability solutions continue to follow the general trends of business software - offering affordable, subscription-based, SaaS licensing for smaller businesses, and adding some measure of configuration or customisation for larger enterprise customers.

Although the market for these solutions is still at an early stage of maturity, we expect to see very little deviation from this established pricing and cloud-native structure, since the barriers to companies taking action on sustainability strategies are already high - and technology companies will be keen not to introduce more friction.

For backend solutions, pricing and deployment follow less of a formula, since these depend heavily on the complexity of the data to be captured and the infrastructure to be built.

We are, though, seeing a strong trend towards modularity and progressive ramp-up being built into the top sustainability solutions this year. Allowing users to start with a level of visibility that is achievable, and that feeds into one or more of their deliverables, with a smooth way to progress to further visibility, is an intelligent way to onboard users at both ends of the spectrum.

This modularity is designed to help brand and retail users to trace a product's journey back to Tier 1, and perhaps Tier 2, suppliers at first, and then to push further upstream - at which point those capabilities can be paired with systems for risk management, supply chain orchestration and more. The same approach also offers a relatively simple structure for ladder pricing.

Modularity within a solution or solution family is also supplemental to the solutions that are offered standalone, but that also form part of a portfolio of platforms such as ERP, PLM, warehousing, pricing and other slices of the value chain. When sustainability features (either front or backend) are added to these portfolios, they are often priced and integrated in a way that makes them more compelling for existing customers.

While this does raise the unpleasant historical spectre of vendor lock-in, at this stage in the maturity journey of sustainability technology (and taking account of the urgency of action) this may be a necessary evil.

As we saw in 2023, there is also encouraging progress being made in the area of supply chain licences and incentives for adoption. In every paradigm of rolling out sustainability technology, suppliers, upstream partners, and agents are essential users and vital sources of data (not just inspection certificates, but emissions and

energy usage figures from on the ground, for example) but these personas can also be beneficiaries of sustainability technology since, if it is properly deployed, it represents an opportunity for them to demonstrate their own sustainability credentials.

Taking account of this context, the drive to make sustainability platforms as affordable, accessible, and logical to use as possible is also a net benefit to the push for traceability and transparency at the source. This is the reason that many sustainability platforms are sold on the strength of their pre-existing upstream user base, and it is also the reason that pre-existing platforms that have extensive supply chain user communities have a ready opportunity to bolt on more frontend sustainability features.

UNDERSTANDING THE USERBASE

The traditional approach, with discrete technology categories, is to try and evaluate them based on the size of their potential addressable market, on the share of that market that has already been sold to, and on the composition of their current userbase.

This is a difficult rubric to apply to sustainability solutions, though, since the modularity of the different products, the blurring of the lines between frontend and backend tools, and the diversity of the user community make tracking these figures problematic. And pricing is also so variable as to make averaging essentially useless.

There is also very limited sales data available to us, although global distribution of the userbase likely remains the same as it was in 2023, with the majority of brand and retail customers located in North America and Europe, and the majority of supply chain and external users concentrated in the Asia Pacific or Latin America markets. While the technology providers who took part in this year's Sustainability Report and the preceding one provided us with insights into their customer base, actual licensing revenue, user counts, and full customer lists for the wider spectrum of frontend and backend solutions are not public.

When we consider the addressable market, the potential scope is huge. At the brand and retail end of the spectrum, progressive legislation is steadily creating a captive market at every stage of the value chain. We wrote last year that sustainability technology has the potential to grow into a market the equal of the other two major technology segments we have evaluated in 2024 - AI and digital product creation (DPC) - and this remains the case, although we should note that neither of those software categories will see essentially mandatory adoption, which has the potential to accelerate the roll-out of sustainability solutions even further.

Last year, our conservative estimate was that there are at least 500 brands using specific sustainability solutions. This figure is likely to be much higher when we consider the supply chain reach, which is measured in the tens of thousands, and in light of the trend line for legislation, the future curve of technology adoption in sustainability has the potential to be unprecedented.

INTEROPERABILITY AND INTEGRATIONS

Because of the ways that frontend and backend solutions - and their capabilities - complement one another, and because effectively every sustainability tech company is aiming for the same target, the industry-wide predisposition is towards integration and interoperability.

In the case of the aforementioned technology providers who have a complete (or near-complete portfolio) of solutions, the flow of data may be better within that ecosystem than it is outside, but broadly speaking the technology community recognises that its users will need many different components - from many different vendors - to achieve their deliverables.

Backend solution providers, for example, are keen to collaborate with frontend tech companies who will elevate the user potential for their infrastructure, models, and data. And, vice versa, frontend technology developers who are candid about the need to populate their tools with first party data are open to bringing in that sort of data from as many sources as possible.

By the same token, each category of solutions also has strong support for integrations to data warehouses and other intermediary platforms.

As a result of this integration, and the common demands of regulations, we are also beginning to see some degree of standardisation of the shape and scope of data. This has not yet meaningfully eased the burden placed on suppliers who need to continually insert the same information in multiple different formats, and into different platforms, but the more deeply these two complementary solution categories intertwine, the closer we will get to that standardisation.



CONCLUSION

Just as it was in 2023, the opportunity for technology companies in sustainability is gigantic. And the potential for brands, retailers, and suppliers to work with and help shape genuinely useful frontend and backend solutions is similarly strong.

This is a market with a clear and growing user demand, and one that is finding a stronger definition of what sustainability technology is actually supposed to accomplish: a base of backend solutions that become the bedrock on top of which a variety of other applications are built, and from which existing applications pull.

But this also remains a fraught area for both technology providers and brands to wade into. Just as governments and advertising standards bodies have cracked down on brands making green claims without substantiating data, the same level of scrutiny will be applied to technology companies - and to the capabilities they actually offer, versus the ones they claim.

From a market growth perspective, though, this creates a fairly concrete picture of the near future of solution selection and deployment. For end users, sustainability technology will either add to the ecosystem in a meaningful way and help customers achieve their deliverables, or they will fall short of expectations.

Based on the progress we have observed in the last twelve months, we are confident that this high bar for success will see the industry advance towards its goals sooner rather than later.

The Interline would like to extend our thanks to every technology and service provider who took part in this Sustainability Report, providing visibility into their customer bases, principles, and pricing models, as well as to all our editorial contributors and to our headline sponsor Munich Fabric Start.

We hope you found value in this publication. We encourage you to bookmark The Interline for more coverage of the full spectrum of sustainability, alongside the rest of the landscape of technology for fashion, throughout 2024/25.





The Sustainability Report

2024

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